

## **COST AND MANAGEMENT ACCOUNTING**

**Course Code:** Acct 2074

**Class:** II ABVM

**Etcts:** 5

**Credit Hours:** 3

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## **LEARNING TASK: COST AND MANAGEMENT ACCOUNTING**

### **3.4.1. Introduction**

This learning task is designed to familiarize students with the concepts of cost accounting and techniques, cost classification and analysis, cost volume profit relationships, master budget, flexible budget and variance analysis, relevant cost information use in decision making and managerial use of cost data.

It is believed that upon the successful completion of this educational task, students will be able acquire special skills and knowledge of cost accounting concepts and principles and apply them in the actual world of business environment.

### **3.4.2. Objectives**

Up on completion of this learning task, students will be able to:

- Outline and distinguish the role of cost accountant, management accountant and financial accounting in the organization.
- Explain cost terminology and classification
- Use the cost- volume-profit techniques for decision making
- Prepare master budget
- Prepare flexible budget and conduct variance analysis
- Apply Relevant Information for decisions in value chain

### **3.4.3. Sections**

#### **3.4.3.1. Section I: Cost and Management Accounting: An overview**

##### **Pre-test**

What cost accounting, management and financial accounting?

.....  
.....

Compare and contrast cost accounting, management and financial accounting?

.....  
.....

Can you list some roles of cost accounting in decision making?

.....  
.....

# CHAPTER I

## COST AND MANAGEMENT ACCOUNTING: AN OVERVIEW

### Section content

- Cost accounting
  - Definition and objectives
  - Its use in decision-making
- The relation between cost accounting, management accounting and financial Accounting
- Learning activity
- Summary

### Cost Accounting

Cost is an amount that has to be paid or given up in order to acquire goods or services. In business, cost is usually a monetary valuation of effort, material, resources, risks incurred, and opportunity forgone in production and delivery of a good or service.

Accounting is the process of identifying, measuring, recording and communicating financial information to interested users so that they can make the best possible decisions. Thus, cost accounting is the process of identifying, measuring, recording and communicating cost information which will be used for determination of cost of a products or services on the basis of historical data. This was the emphasis of cost of accounting for many years, however in the course of time, the determination of cost of product or service has become equally important with cost control due to competitive nature of the market and because of technological developments in all areas. Thus, now a day's cost control and reduction has also come within the scope of cost accounting.

Modern cost accounting is, thus, concerned with recording, classifying and reporting cost information for:

- Determination of costs of products or services,
- Planning, controlling and reducing costs and
- Furnishing of information to management for decision making.

### Definitions

According to **T. Horngren** "Cost accounting measures and reports financial and other information related to the acquisition or consumption of an organization's resources. Cost accounting provides information to both management accounting and financial accounting.

The **Chartered Institute of Management Accountants (CIMA)** defines it as," The establishment of budgets, standard costs and actual cost of operations, processes, activities or products and the analysis of variances, profitability or the social use of funds".

**Wilmot** has summarized the nature of cost accounting as, “the analyzing, recording, standardizing, forecasting, comparing, reporting and recommending” and the role of cost accountant as that of “a historian, news agent and prophet”. As a historian he must be meticulously accurate and sedulously impartial. As a newsagent he must be up to date, selective and pithy. As a prophet he must combine” knowledge and experience with foresight and courage”.

### **Role of Cost Accounting in Decision Making**

Many factors are considered while fixing the price of a product/item such as competitors’ price etc. One of the basic factors is the cost of its production. Cost is essential not only to fix price but also to ascertain the margin of profit.

Knowledge of the cost determination is also necessary to keep a check on the cost of product/control on wastages, etc. The accounting used to study the various aspects of cost is known as cost accounting.

The main areas of decision making where cost accounting is very much helpful can be summarized as follows:

- Ascertaining product unit cost
- Controlling cost
- Stimulating cost consciousness
- Determining selling price
- Determining profit and loss for various products and services and inventory valuation and
- Providing basis for formulating operating policies.

### **Management accounting**

Management accounting is the process of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of financial (and non financial) information used by management to plan, evaluate, and control the organization and to assure appropriate use and accountability for its resources. The management accountant is expected to provide timely, accurate information including budgets, standard costs, and variance analyzes, support for so that planning, organizing, directing and controlling of business operations can be done in an orderly manner.

Management accounting information helps organization make better decisions. Such decisions make all organizations become more cost effective and help manufacturing, retail and service organizations becomes more profitable. The major objectives of managerial accounting activity are:

- Providing managers with information for decision making and planning
- Assisting managers in directing and controlling operational activities
- Motivating managers and other employees toward the organizational goals
- Measuring the performance of subunits, managers and other employees within the organization.

Managerial accountants supply all kinds of information to management and act as strategic business partners in support of management's role in decision making and managing the organization's activities. Measuring, managing and continuously improving operational activities is critical to the organization's success.

Management accounting provides valuable services to management in all of its functions as summarized below:

- ☛ **Planning:** Management accounting makes an important contribution in performance of the planning function. It makes available the relevant data after pruning and analyzing them suitably for effective planning and decision-making.
- ☛ **Controlling:** It involves evaluation of performance keeping in view that the actual performance coincides with the planned one and remedial measures are taken in the event of variation between the two.
- ☛ **Coordinating:** It involves interlinking of different divisions of the business enterprise in a way so as to achieve the objectives of the organization as a whole.
- ☛ **Organizing:** A sound system of internal control and internal audit for each of the cost or profit centers helps in organizing and establishment of a sound business structure.
- ☛ **Motivating:** It involves maintenance of a high degree of morale in the organization. The superiors should be in a position to find out whom to demote or promote and to reward or penalize.
- ☛ **Communicating:** Communicating involves transmission of data, results etc. both to the insiders as well as outsiders. The management owes a duty to the creditors, prospective investors, shareholders etc to communicate to them about the progress, financial position etc of the enterprise. Management accounting helps the management in performance of their function by developing a suitable system of reporting.

## Management Accounting Guidelines

Three important guidelines help management accountants provide the most value in performing their functions. They are: -

- a) Cost-benefit approach
  - b) Behavioral and technical considerations and
  - c) Different costs for different purposes.
- a) **Cost benefit approach:** Management accountants continually face resource allocation decisions. A cost benefit approach should be used in these decisions-resources should be spent if they promote decision making that better attains organizational goals in relation to the costs of those resources. The expected benefits from spending those resources should exceed their expected costs.
- b) **Behavioral and Technical considerations:** A management accounting system should have two simultaneous missions for providing information:
- ◆ To help managers make wise economic decisions, and
  - ◆ To motivate managers and other employees to aim and strive for goals of the organization.
  - ◆ Both accountants and managers should always remember that management system are not confined exclusively to technical matters such as the type of computer software systems used and the frequency with which reports are prepared. Management is primarily a human activity that focus on how to help individuals do their jobs better. For example it is often better for managers to personally discuss how to improve performance with under performing workers rather than just sending these workers a report highlighting their underperformance.
- c) **Different costs for different purposes.** The different costs for different purposes theme is the management accountant's version of the "one shoe does not fit all size" nation. A cost concept used for the external reporting purpose may not be an appropriate concept for internal routine reporting to managers. Consider the advertising costs associated with launching a major new product. For external reporting to shareholders, television-advertising costs are fully expensed in the income statement in the year they are incurred. In contrast, for evaluating management performance (internal reporting purpose), the television advertisement costs could be capitalized and then written off as expenses one several years. There are multiple external parties and multiple internal parties for which financial reports are prepared. Any specific accounting method is unlikely to be the

preferred method for all external parties or all internal parties. Indeed, even an individual manager may prefer accounting method A for one decision and accounting method B for another decision.

## **The main Differences between the Terms**

### **a. Cost accounting and Management accounting**

*Cost accounting* refers to the accounting procedures relating to recording of all incomes and expenditure and the preparation of periodical statements and reports with the object of ascertaining and controlling costs. It is thus the formal mechanism by means of which the cost of products or services are ascertained and controlled.

On the other hand Management accounting involves collecting, analyzing, interpreting and presenting all accounting information, which is useful to the management. It is closely associated with management control, which comprises planning, executing, measuring and evaluating, the performances of an organization. Thus, Management accounting depends heavily on cost data and other information derived from Cost accounting.

*Management accounting* has a wider scope as compared to cost accounting. Cost accounting primarily deals with cost data while management accounting involves the considerations of both cost and revenue. Management accounting is an all-inclusive accounting information system, which covers financial accounting, Cost accounting and all aspects of Financial Management. But it is not substitute for other accounting functions. The main thrust in Management Accounting is towards determining policy and formulating plans to achieve desired objective of management. Management accountancy makes corporate planning and strategy effective and meaningful.

### **b. Cost Accounting and Financial Accounting**

*Financial accounting* is primarily concerned with the preparation of financial statement, which summarizes the results of operation for selected period of time and show the financial position of the corporation at a particular date.

*Cost accounting* is primarily concerned with determination of cost of something, which may be a product, service, a process or an operation. A cost accountant is primarily charged with the responsibility of providing cost data for whatever purposes they may be required.

### **c. Management Accounting and Financial Accounting**

Management accounting and financial accounting are linked by their responsibilities for summarizing and reporting information for interested parties, yet the two differ in some ways.

Financial accounting includes all the principles that regulate the accounting and reporting of financial information that must be disclosed to outside users, such as shareholder, creditors etc. On the other hand, management accounting exists primarily for the benefit of managers inside a company, the people who are responsible for day-to-day operations of the firm. However, financial accounting and management accounting are part of and use data from a company's management information system. Much of the financial data generated by a company's events activities and actions are used for both financial and management accounting purposes.

Cost accounting integrates with financial accounting by providing product costing information for financial statements and with management accounting by providing some of the quantitative, cost-based information managers need to perform their tasks.

**Learning activity**

What are cost accounting, management accounting and financial accounting? Explain their differences, similarities and their inter relation ships.

.....  
.....

**Summary**

Cost accounting is the process of determining and accumulating the cost of product or activity. It is a process of accounting for the incurrence and the control of cost. Financial accounting is designed to meet external information needs and management accounting attempts to satisfy internal information needs. Cost accounting creates an overlap between financial accounting and management accounting. Cost accounting integrates with financial accounting by providing product costing information for financial statements and with management accounting by providing some of the quantitative, cost-based information managers need to perform their tasks.

## CHAPTER II

### COST TERMINOLOGY AND CLASSIFICATION

#### Section content

- Costs and cost terminology
  - Direct costs and indirect costs
- Cost behavior pattern
  - Fixed and variable costs
  - Cost drivers
  - Relevant range
- Manufacturing costs
  - Direct material costs
  - Direct labor costs
  - Manufacturing overhead costs
  - Inventorable costs and period costs
  - Prime costs and conversion costs
- Non manufacturing( period) costs
- Learning activity
- Summary

#### Costs and Cost Terminology

According to **Carl .S. Warren**, the term cost refers to all payments of cash for the purpose of generating revenues. Costs can be either expensed or capitalized. Expensed costs are treated as expenses in the period cash is paid. Capitalized costs are treated as assets in the period cash is paid and expensed in future periods when it is consumed.

According to **J. Horngren**, cost refers as resource sacrificed or foregone to achieve a specific objective. It is usually measured as the monetary amount that must be paid to acquire goods and services.

**Cost object:** is any thing for which a separate measurement of costs is desired. To guide their decisions, managers want to know how much a particular thing (such as a product, machine, service, or process) costs. Thus, Product, machine, service, project, customer, brand category, activity department are cost object.

**Cost accumulation:** is the collection of cost data in some organized way by means of an accounting system. For example, organizations that manufacture consumer goods accumulate the costs incurred in producing the commodities.

**Cost assignment:** is a general term that encompasses both tracing accumulated costs to a cost object, and allocating accumulated costs to a cost object. Example, cost may be assigned to a department to facilitate decisions about departmental efficiency and again cost may be assigned to a product or a customer to facilitate product-profitability analysis

**Cost driver:** is any activity that causes costs to be incurred. A cost Driver is characteristics of an activity or event that causes that activity or event to incur costs. The cost driver of variable costs is the level of activity or volume whose change causes the (variable) costs to change proportionately. For example the number of vehicles assembled is a cost driver of the cost of steering wheels, Fuel cost at Transport Corporation is derived by number of tons of cargo transported or distance travelled.

## **Classification of Costs**

### **Direct Costs and Indirect Costs**

For the purpose of assigning costs to cost objects, costs are classified as direct cost and indirect costs.

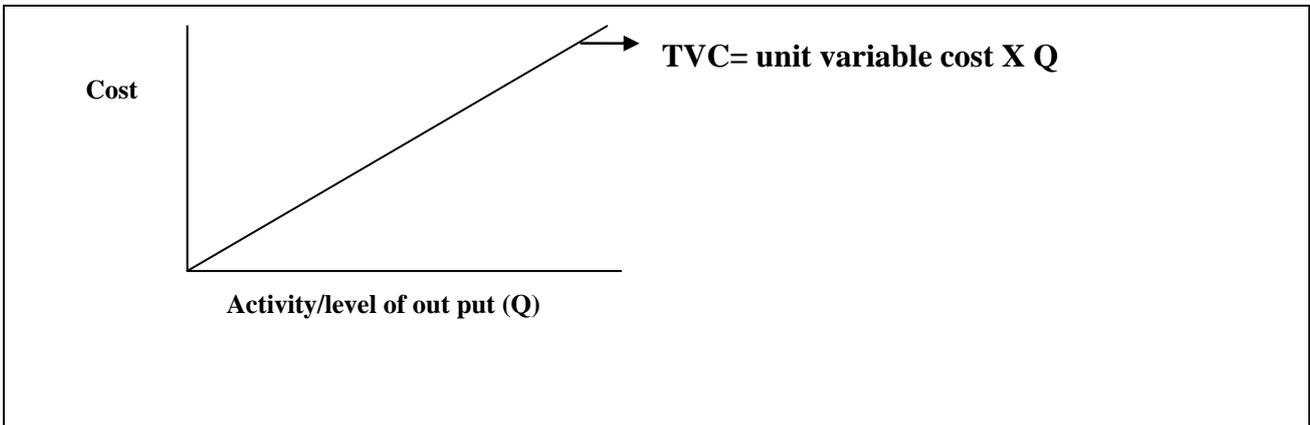
**Direct costs:** are costs that can be conveniently or economically traced to a cost object. For example, the cost of bottles is a direct cost of a Pepsi soft drink, because it can be conveniently and economically traced to the Pepsi soft drink. The other example, the wages of production line workers can be conveniently traced to the product because the time worked and the related hourly wages can be easily found by looking at time cards and payroll records.

**Indirect costs:** are costs that cannot be conveniently or economically traced to a cost object. Example, the cost of quality control personnel who taste and content tests on multiple soft drink products bottled at a Pepsi plant is an indirect cost of a Pepsi soft drink. Unlike cost of bottles, it is difficult to trace quality control personnel costs to a specific Pepsi soft drink.

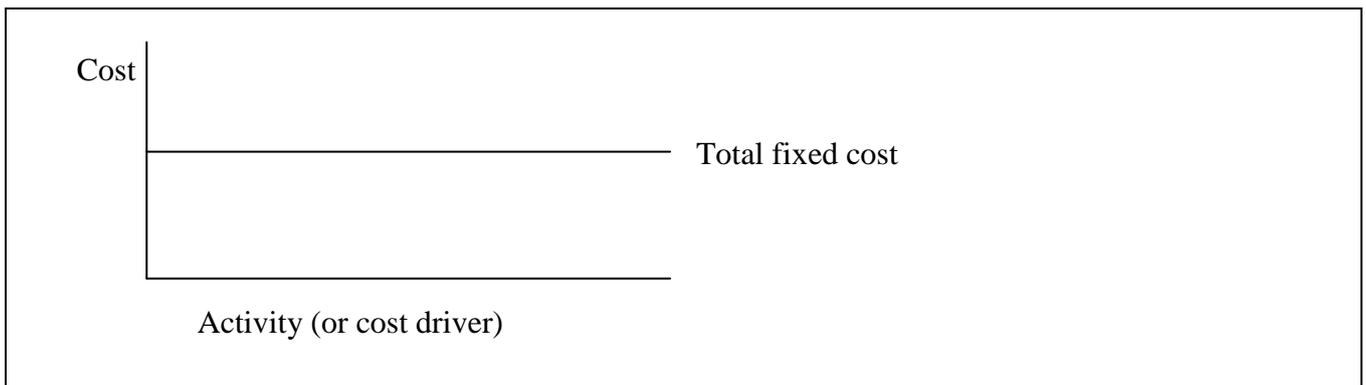
### **Behavioral classification of costs**

Managers are also interested in the way costs respond or behave to changes in volume or level of activity. By analyzing those patterns of behavior, managers gain information about how changes in selling prices or operating costs affect the net income of the organization. Thus, based on their behavior cost can be classified as variable, fixed and mixed costs

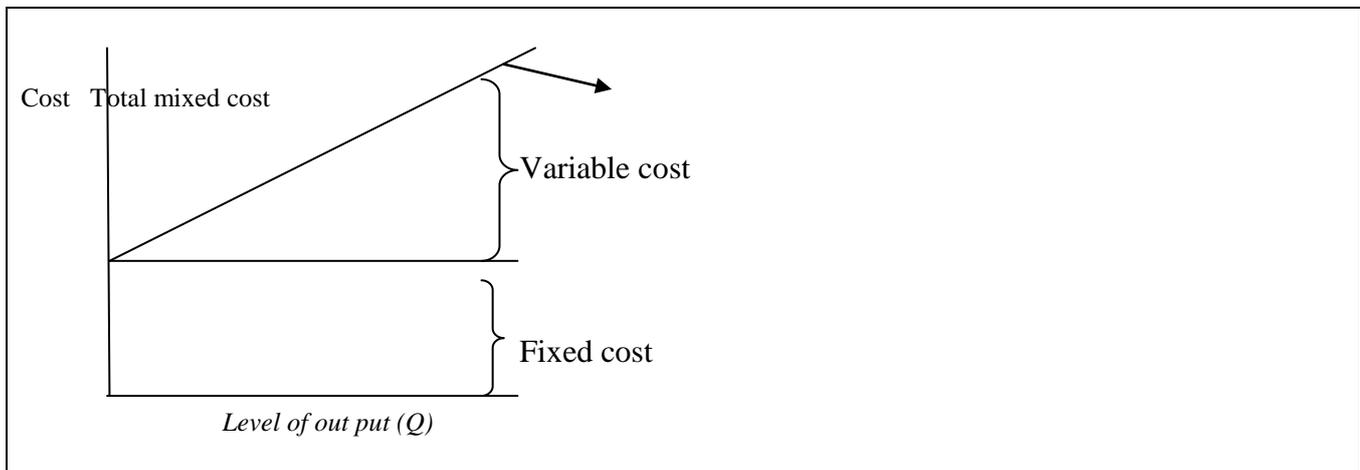
**Variable cost:** are costs that vary in total, in direct proportion to changes in the level of activity or cost driver i.e. if activity increase by n%, total variable cost also increase by n%, but the per unit cost remains constant. E.g. direct material cost, direct labor cost, commission paid to sales personnel, wages paid to employees will increase as level of output increases. Graphically, total variable cost can be explained as follows:



**Fixed Cost:** are costs that remain unchanged in total regardless of variation in the level of activity or cost driver in a given relevant range. If activity increases or decreases by n% within the given relevant range, total fixed cost remains the same; but the per unit fixed cost changes. Example, monthly rental cost of equipment and /or house, depreciation of machines used to produce furniture's is fixed in total per year regardless of the level of production, but in unit, fixed costs are variable i.e. fixed cost per unit increases as level of production decrease and it decreases as level of out put increases. Graphically, fixed cost can be summarized as follows:



**Mixed costs:** are costs that have both variable and fixed characteristics. These costs are often called mixed costs or semi-variable or semi-fixed costs. Mixed costs have an element that is constant regardless of change in level of activity and an element that is variable as level of activity changes. For example, utility costs like telephone, electric and water charges are composed of monthly fixed charge plus some other variable costs which depends on the level of usage.



### **Product cost and period costs**

For financial reporting purposes, costs are often classified as either product costs or period cost.

**Product costs:** are cost producing goods that are sold to customers. They are also called manufacturing cost and are composed of Direct Material, Direct Labor and Factory overhead.

**Direct Material Costs:** - All manufactured products are made from basic direct materials.

Direct materials are the acquisition costs of materials that can be conveniently and economically traced to specific unit of product. Acquisition cost of direct materials includes freight –in charges, sales taxes and customs duties. Some examples of direct materials are iron ore for steel, sheet steel for automobiles and sugar for candy.

**Direct Labor Costs:** are the costs of labor to complete production activities that can be conveniently and economically traced to specific units of product. The wages of machine operators and other workers involved in actually shaping the product are direct labor costs.

**Manufacturing Overhead Costs:** The third elements of product cost include all manufacturing costs that cannot be classified as direct materials or direct labor costs. Manufacturing overhead costs are production related costs that can't be practically or conveniently traced directly to an end product. This assortment of costs is also called factory overhead, or indirect manufacturing costs. Two common components of manufacturing overhead costs are indirect material costs, indirect labor costs and other manufacturing overhead costs.

**Indirect material costs:** are the costs of materials that cannot be conveniently or economically traced to a unit of product e.g. cost of nails, reverts, lubricants and small tools.

**Indirect labor costs:** are labor costs for production related activities that cannot be conveniently or economically traced to a unit of product. E.g. cost of labor for maintenance, inspection, engineering design, supervision, materials handling and machine handling.

**Other indirect manufacturing costs:** Cost of building and machine maintenance, property taxes, property insurance and depreciation on plant and equipment used in production. These costs are treated as assets until the product is sold as raw material inventory, work in process inventory and finished goods inventory and later expensed in the form of cost of goods sold when the product is sold.

**Period (non manufacturing) costs:** Period costs are all goods in the income statement other than cost of goods sold. These costs are treated as expenses of the period in which they are incurred because they are assumed not to benefit future periods. Expensing these costs immediately best matches to revenues.

For manufacturing sector companies, period costs include all non-manufacturing costs for example, selling cost, administration cost and Research and Development costs. For merchandising-sector companies, period costs include all costs not related to the cost of goods purchased for resale in the same form (for example, labor cost of sales floor personnel and marketing costs). For service sector companies, since there are no inventorable costs, all their costs are period costs.

**Prime cost and conversion costs:**

In manufacturing companies, the costs can again be classified as Prime Cost and conversion costs.

**Prime costs:** are all direct manufacturing costs i.e. direct material costs and direct manufacturing labor cost.

**Conversion Costs:** are all manufacturing costs other than direct material costs. Manufacturers typically use people and machines to convert raw material to output that has substance. Thus, conversion costs are the costs incurred to convert direct material into the final product, namely, costs for direct labor and manufacturing overhead.

**Controllable and uncontrollable costs**

Controllable costs are those costs, which can be influenced by the action of a specified member of the undertaking. If a manager can control or heavily influence the level of cost, then that cost is classified as a controllable cost. Costs that a manager cannot influence significantly are classified as uncontrollable cost of that manager.

Many costs are not completely under the control of any individual. In classifying costs as controllable or uncontrollable, managerial accountants generally focus on a manager's ability to influence costs.

### **Economic Characteristics of Costs**

In addition to accounting cost classifications, such as product costs and period costs, managerial accountants also employ economic concepts in classifying costs. Such concepts are often useful in helping accountants decide what cost information is relevant to the decisions faced by the organization's managers. Some of the most important economic cost concepts are:

- Opportunity costs
- Out-of-pocket costs
- Sunk costs
- Differential costs
- Marginal costs and Average costs

**Opportunity cost:** is defined as the benefit that is sacrificed when the choice of one action precludes taking an alternative course of action. If goat meat and fish are the available choices for dinner, the opportunity cost of eating goat meat is the foregone pleasure associated with eating fish.

**Sunk Costs:** Such costs are past or historical cost. These are costs, which have been created by a decision that was made in the past that cannot be changed by any decision that will be made in the future. Investments in plant and machinery, buildings, etc., are important examples of such costs. Since later decisions can't alter sunk costs, they are irrelevant for decision-making.

**Differential Cost:** The difference in total cost between two alternatives is known as differential cost. In case the choice of an alternative results in increase in total cost, such increased costs are known as incremental costs. While assessing the profitability of a proposed change, the incremental costs are matched with incremental revenue.

Differential cost is a technique used in the preparation of adhoc information in which only cost and income differences between alternative courses of action are taken into consideration. Thus, in case of differential costing a comparison is made between the cost differential and income differential between two or more situations and decisions regarding adopting a particular course of action is taken if it is on the whole profitable.

**Marginal costs and Average costs-** marginal cost is the extra cost incurred when one additional unit is produced. The average cost per unit is the total cost of quantity manufactured divided by the number of units manufactured.

### **Summary**

In this section, we have looked at different cost terms and some of the ways in which managers classify costs. For purposes of valuing inventories and determining expenses for the balance sheet and income statement, costs are classified as either product costs or period costs. Based on cost behavior, managers commonly classify costs in to variable fixed and mixed. For purposes of assigning costs to cost objects such as products or departments, costs are classified as direct or indirect. For purposes of making decisions, the concepts of differential costs and revenue, opportunity cost, and sunk cost are of vital importance.

## CHAPTER III

### PRODUCT COSTING AND COST FLOW

#### Section content

- Concept of costing systems
- Job costing
  - Job costing in manufacturing firms
  - Job costing system and transactions in manufacturing firms
  - Budgeted indirect cost and end period adjustment
- Learning activity
- Continuous assessment
- Summary

#### Product Costing

Product costs in manufacturing firm are the sum of direct material, direct labor and overhead cost of producing a given product. Thus, production cost per unit is the sum of direct material cost per unit, direct labor cost per unit and overheads cost per unit.

There are two main types of cost accounting systems for product costing: Job order and process costing systems.

**Job order costing system:** is a product costing system used by both manufacturing companies and service organizations that make large, unique, or special order products such as customized publications, specially built cabinets, custom printing business etc. Under such a system, the costs of direct materials, direct labor, and manufacturing overhead is traced to a specific job order or a batch of products. A job order is a customer order for a specific number of specially designed, made to order products. Job order costing measures the cost of each complete unit. It uses one work in process inventory account to summarize the cost of all jobs. This account is supported by job order cost cards or a subsidiary ledger of accounts for each job.

**Process costing system:** is a product costing system used by companies that produce large amounts of similar products or liquids, or that have a continuous production flow. Makers of paint, soft drinks, bricks, milk or paper would use a process costing system. Under such a system, the cost of direct materials, direct labor and manufacturing overhead are first traced to processes, departments, or work cells and then assigned to the products manufactured by those processes, departments or work cells. A process costing system uses several works in process inventory accounts, one for each process, department or work cell.

## Job costing

Job order costing is an accumulation of costs by specific jobs, contracts, or orders. It keeps track of costs as follows: direct material and direct labor are traced to a particular job and costs not directly traceable-factory overhead-are applied (allocated) to individual jobs, using a predetermined overhead rate. The overhead rate is equal to the budgeted annual overhead divided by the budgeted annual activity units (direct labor-hours, machine-hours, etc.). At the end of the year, the difference between actual overhead and overhead applied is closed to cost of goods sold, if there is an immaterial difference. On the other hand, if a material difference exists, work-in-process, finished goods, and cost of goods sold are adjusted on a proportionate basis based on units or dollars at year-end for the deviation between actual and applied overhead.

As products are manufactured, the costs of direct materials and direct labor are transferred to the work in process inventory account and are recorded on the job's job order cost card. Manufacturing overhead costs are applied and charged to the work in process inventory account using a predetermined overhead rate. Those charges are used to reduce the balance in the manufacturing overhead account. They two are recorded on the job's job order cost card.

When products and jobs are completed, the costs assigned to them are transferred to the finished goods inventory account. When the products are sold and shipped; their costs are transferred to the cost of goods sold account. The summarized **JOURNAL ENTRIES** are illustrated as follows:

S.No	Particulars	Ref.No	Debit	Credit
1.	<b>When the <u>materials are purchased (on Credit):</u></b> Materials control Accounts payable control		XXXX	XXXX
2.	<b>When the <u>materials are purchased (on Cash):</u></b> Materials control Cash paid		XXXX	XXXX
3.	<b>When <u>materials are sent to manufacturing plant:</u></b> Work in Process Control (for direct material) Manufacturing overhead control (for indirect material) Materials control		XXXX XXXX	XXXX
4.	<b>When <u>labor costs are assigned:</u></b> Work in process control (direct labor) Manufacturing overhead control (indirect labor) Wages payable control		XXXX XXXX	XXXX

5.	<b><u>When payment of total manufacturing payroll:</u></b> Wages payable control Cash control		XXXX	XXXX
6.	<b><u>When manufacturing overhead costs are incurred:</u></b> Manufacturing Overhead control Various Accounts		XXXX	XXXX
7.	<b><u>When manufacturing overheads is allocated:</u></b> Work in process control Manufacturing overhead control		XXXX	XXXX
8.	<b><u>When jobs are completed and transferred to finished goods account:</u></b> Finished goods control Work in process control		XXXX	XXXX
9.	<b><u>When transferring finished goods to cost of goods sold:</u></b> Cost of goods sold Finished goods control		XXXX	XXXX
10.	<b><u>When marketing and customer service payable and advertising costs accrued:</u></b> Marketing and Advertising costs Customer – service costs Salaries payable control Accounts payable control		XXXX XXXX	XXXX XXXX
11.	<b><u>When sales are made on account:</u></b> Accounts receivable control Sales or Revenues		XXXX	XXXX

### **Job Costing Procedures**

The starting point of the job costing system is the production order. Once an order has been accepted, the production department will make out a production and manufacturing. Production order is the starting point for the cost accountant to prepare a job cost card/sheet.

Job cost sheet is the basic record form for a job order costing system. In fact, it is a cost sheet on which the cost accountant records the costs incurred as the job passes through the factory. When job cost sheet is complete, it shows the total cost of the completed job which is composed of three elements (direct material cost, direct labor cost and over head cost) as shown at the end of this section.

### **Accounting for materials in job order costing system**

The term “materials” refers to such commodities which are supplied to the manufacturing industry in original forms. They are raw in nature and have to be processed further to be sold to customers.

In manufacturing enterprises, materials are recorded using a control account called materials. Cost accounting for materials involves; the purchase of materials and the issuance of materials for production use

Cost accounting techniques for the purchase of materials are similar to those studied in general accounting for a perpetual inventory method. As materials are purchased and received, the amount is debited to materials or materials inventory account as follows:

Materials -----	XXXX
Accounts payable -----	XXXX

When a job is orders is started, the necessary material are issued to the factory i.e. materials are transferred from the store room to the factory in response to material requisitions, which may be issued by the manufacturing department concerned or by a central scheduling department. .

A summary of the materials requisitions completed during the month serves as the basis for transferring the cost of the materials from the controlling account in the general ledger account to the controlling account for work in process and factory overhead. The flow of materials into production is illustrated by the following entry:

Work in process (direct material) .....	XXXX
Factory overhead (indirect material).....	XXXX
Materials .....	XXXX

**Accounting for Labor in Job Costing System**

In manufacturing process, the raw materials are converted into completed finished goods using labor and manufacturing facilities. Accounting for labor is critical to determine the proper cost of a job or a product. Just as it necessary to know the cost of material input in each product or job the organization produces, it is also necessary to know the amount or cost of the labor and time spent on each product or job as this is part of the cost of the job or product.

For direct workers, job cards may also be maintained to record the time spent on particular orders as a basis for cost accounting. A job card is a record of time spent on job. At regular intervals usually daily or weekly, the direct labor time and cost for each job are entered on the job order cost sheets. For each payroll period-weekly, biweekly, or monthly-the summary of employees’ earnings and the liabilities for payments are journalized and posted to the general ledger.

### **Journal Entry**

Work-In process (direct labor) ----- XXXX  
Factory overhead (Indirect labor) ----- XXXX  
Wages payable ----- XXXX

### **Accounting for Manufacturing Overheads in Job Costing System**

Factory overhead includes all manufacturing costs except direct materials and direct labor. Examples of factory overhead costs, in addition to indirect materials and indirect labor, are depreciation, electricity, fuel, insurance, and property taxes on factory plants.

### **Budgeted rate in Applying overhead**

Management wants to know the overhead cost of producing different products. This will help management in product pricing, income determination and inventory valuation; they must be timely as well as accurate.

The actual overhead cost or rate can be determined only at the end of the year, after actual results are determined. However, this timing would be too late as managers want product cost information throughout the year for decision making. To meet these needs, accountants usually budget overhead application rates i.e. they estimate or compute a rate in advance of production and adjustment is made at year for the difference between actual overhead cost and the one allocated to products or jobs based on estimated rate.

To allocate overhead cost to specific job, budgeted factory overhead rate is first computed by dividing the total budgeted overhead cost by budgeted application base (cost driver) and the application is made by multiplying the budgeted rate by actual cost driver for each job.

The following entry is made to record manufacturing overhead cost applied:

Work in process..... XXXX  
Manufacturing overhead..... XXXX

The actual overhead costs are recorded as follows as they are incurred over the year:

Manufacturing overhead..... XXXX  
Accumulated Depreciation..... XXXX  
Cash..... XXXX  
Prepaid assets..... XXXX

At the end of the year, adjustment is made for any differences between the amount of overhead actually incurred and the amount of overhead applied (allocated) to products. The amount by which actual overhead exceeds the applied overhead is called under applied

overhead. If actual overhead had been less than applied overhead, the difference would have been called over applied overhead.

Journal entries for adjustment of over or under application of overhead costs

**For under applied:**

Particulars	Debit	Credit
Cost of goods sold	XXXX	
Manufacturing overhead		XXXX

**For over applied:**

Manufacturing overhead	XXXX	
Cost of goods sold		XXXX

Bilisuma Company		Job order No	5574
Shager Street		Date ordered:	1/10
For: Finfinne Construction Company		Date started:	1/14
PRODUCT:# Maple Drain Boards		Date Wanted:	1/22
SPECIFICATION: 12'x 20" x1" clear Finishes		Date completed:	1/18
Quantity: 10			
<b>Direct Material</b>			
Date	REQ.NO	Amount	
1/14	516	Br. 1,420.00	
1/17	531	780.00	
1/18	544	310.00	
Subtotal		<b>Br. 2,510.00</b>	
<b>Direct Labor</b>			
Date	Hours	Cost	
1/14	40	Br. 320.00	
1/15	32	256.00	
1/16	36	288.00	
1/17	40	320.00	
1/18	48	384.00	
Subtotal	<b>196</b>	<b>Br. 1568.00</b>	
<b>Factory overhead Applied</b>			
Date	Rate of application	cost	
1/14	16.20	Br. 684.00	
1/16	10.00	400.00	
1/17	3.20	128.00	
Subtotal	<b>29.40</b>	<b>Br. 1,176.00</b>	
Direct materials	Br 2,510.00	Selling price	Br. 7860.00
Direct labor	1,568.00	<b>less: production cost</b>	Br.5254.00
Factory overhead Applied	<u>1,176.00</u>	marketing Expense	776.00
		Admin. Expense	<u>420.00</u>
Total production Cost	<b><u>Br. 5,254.00</u></b>	Cost to make and sell	<u>(6,450.00)</u>
		<b>Profit</b>	<b>Br. 1,410.00</b>



## CHAPTER IV

### COST-VOLUME-PROFIT (CVP) ANALYSIS AND ITS IMPLICATIONS

#### Section content

- Definition of cost-volume-profit (CVP) analysis
- Assumptions of cost-volume-profit analysis
- Essential features/terminology of CVP analysis
- The Breakeven Point (BEP)
- Methods to express CVP relationships
- Effects of Sales Mix on Income
- Sensitivity Analysis (or What-if Analysis) and Uncertainty
- Contribution Margin and Gross Margin

#### Definition of cost-volume-profit (CVP) analysis

Cost-volume-profit (CVP) analysis: is a study of the relationship between cost, volume, and profit. It examines the behavior of total revenues, total costs, and operating income as changes occur in the output level (volume), selling price, variable costs per unit, or fixed costs. Managers commonly use CVP analysis as a tool to answer questions like how will revenues and costs be affected:

- ✓ If we sell 1,000 more units?
- ✓ If we raise or lower our selling prices?
- ✓ If we expand business into overseas market?

These questions have a common “what-if” theme. By examining various possibilities and alternatives, CVP analysis illustrates various decision outcomes and thus serves as an invaluable aid in the planning process.

#### Assumptions of Cost-Volume-Profit Analysis

Cost-volume-profit analysis is based on several assumptions. These are:

1. Changes in the level of revenues and costs arise only because of changes in the number of product (or service) units produced and sold. The number of output units is the only revenue and cost driver. Just as a cost driver is any factor that affects costs, a revenue driver is any factor that affects revenues.
2. Total costs can be divided into a fixed component and a component that is variable with respect to the level of output. Variable costs include both direct variable costs and indirect variable costs of the product. Similarly, fixed costs include both direct fixed costs and indirect fixed costs of the product.

3. When graphed, the behavior of total revenues and total costs is linear (straight line) in relation to output units within the relevant range (and time period).
4. The unit selling price, unit variable costs, and fixed costs are known and constant.
5. The analysis either covers a single product or assumes that the sales mix when multiple products are sold will remain constant as the level of total units sold changes.
6. All revenues and costs can be added and compared without taking into account the time value of money.
7. Units manufactured equal to units sold

### **Essential terminology of CVP analysis**

- ❖ **Operating income (OI)** = Total revenues from operations – Costs of goods sold and operating cost (excluding income taxes)
- ❖ **Net income:** is operating income plus non-operating revenues (such as interest revenue) minus non-operating costs (such as interest cost) minus income taxes. For simplicity, throughout this chapter we assume non-operating revenues and non-operating costs are zero. Thus, net income is computed as:

$$\text{Net income} = \text{Operating income} - \text{Income taxes}$$

- ❖ **Contribution margin (CM):** is the difference between total revenues and total variable costs. Contribution margin is an effective summary of the reasons that operating income changes as the number of units sold changes. Contribution margin is a key concept in CVP analysis. It represents the amount of revenues minus variable costs that contribute to recovering fixed costs. Once fixed costs are fully recovered, contribution margin contributes to operating income.

$$\text{Total Contribution Margin} = \text{Total Revenues} - \text{Total Variable Costs}$$

- ❖ **Contribution margin per unit (CMU):** is a useful tool for calculating contribution margin. The contribution margin per unit is the difference between the selling price and the variable cost per unit.

$$\text{Contribution Margin per Unit} = \text{Selling Price per Unit} - \text{Variable Cost per Unit}$$

Instead of expressing the contribution margin as a per unit amount, we can also express it as a percentage. Contribution margin percentage (also called contribution margin ratio) is the contribution margin per unit divided by the selling price. The contribution margin percentage is the contribution margin achieved per dollar of revenues.

$$\text{CM\%} = \text{CMU/SPU} \text{ or } \text{CM\%} = \text{TCM/TR}$$

In other words, contribution margin ratio is the proportion of each sales dollar available to cover fixed costs and provide for profit.

$$\text{Contribution Margin \%} = 1 - \text{Variable Cost \%}$$

❖ **Variable cost ratio:** is the proportion of each sales dollar that must be used to cover variable costs.

$$\text{VC\%} = \text{VCU/SPU}$$

### **The Breakeven Point (BEP)**

Breakeven point (BEP) is that quantity of output sold at which total revenues equal total costs—that is, the quantity of output sold at which the operating income is zero (\$0). Why would managers be interested in the breakeven point? Managers are interested in the breakeven point mainly because they want to avoid operating losses, and the breakeven point tells them how much output they must sell to avoid a loss. The breakeven is often stated in terms of units or sales dollar required to breakeven.

*The following abbreviations are useful in the subsequent analysis:*

- ✓ SPU = Selling price per unit
- ✓ VCU = Variable cost per unit
- ✓ CMU = Contribution margin per unit (SPU-VCU)
- ✓ CM % = Contribution Margin Percentage (CMU/SPU)
- ✓ FCs = Fixed costs
- ✓ Q = Quantity of output units sold (and manufactured)
- ✓ OI = Operating income
- ✓ TOI = Target operating income
- ✓ TNI = Target net income

### **Methods to Express CVP Relationships**

Three methods to express CVP relationships are the equation method, the contribution margin method, and the graph method. The first two methods are most useful for analyzing operating income at a few specific levels of sales. The graph method is useful for visualizing the effect of sales on operating income over a wide range of quantities sold.

#### **1. Equation Method**

Under the equation method, the income statement can be expressed using the preceding terminology in the form of the following equation:

Total Revenues - Total Variable Costs – Total Fixed Costs = Operating Income

$$(\text{SPU} \times \text{Q}) - (\text{VCU} \times \text{Q}) - \text{TFC} = \text{OI}$$

This equation provides the most general and easy-to-remember approaches to any CVP situations.

## 2. Contribution Margin Method

The contribution margin method simply uses the concept of the contribution margin to rework the equation method.

$$TR - TVC - TFC = OI$$

$$(SPU \times Q) - (VCU \times Q) - TFC = OI$$

$$Q (SPU - VCU) = FC + OI$$

$$Q (CMU) = FC + OI$$

$$Q (CMU) / CMU = (FC + OI) / CMU$$

$$Q = (FC + OI) / CMU$$

At the breakeven point, operating income, is by definition, zero. Setting  $OI = 0$ , we obtain

$$Q (CMU) / CMU = (FC + 0) / CMU$$

$$Q = TFC / CMU$$

*Breakeven Number of Units = Fixed costs divided Contribution margin per unit*

We can also algebraically manipulate the above equation to calculate breakeven revenues using the contribution margin percentage. Multiplying both sides of the above equation by the SPU gives:

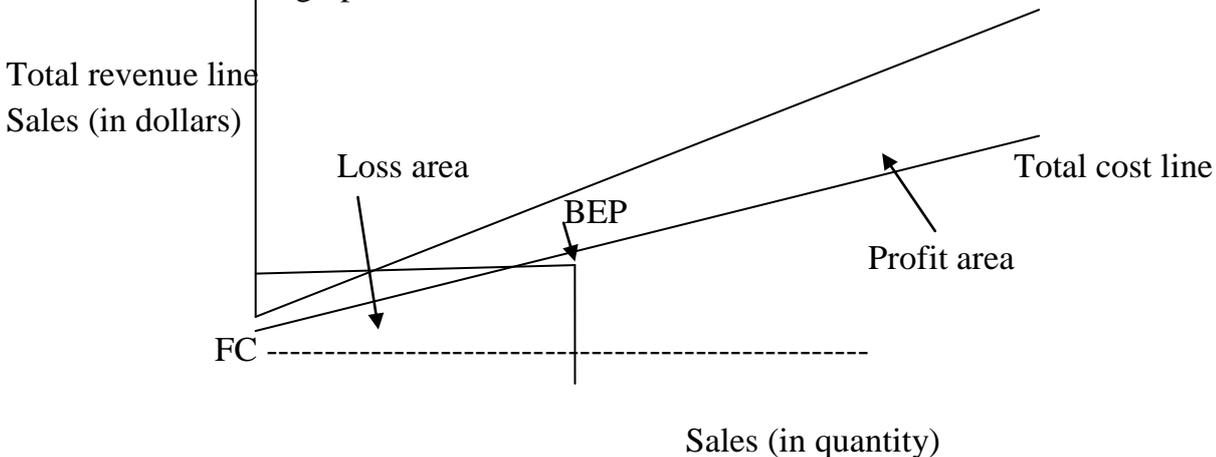
$$\text{Breakeven in Revenues Dollars} = \text{Breakeven Number of Units} \times \text{SPU}$$

$$= (FC / CMU) \times \text{SPU} \dots \text{by dividing both numerator and denominator by SPU}$$

$$\text{Breakeven in Revenues Dollars} = FC / CM\%$$

## 3. Graph Method

In the graph method, we represent total costs and total revenues graphically. Each is shown as a line on a graph.



The total cost line is the sum of fixed costs and variable. The slope of the total costs line is the *variable cost per unit*. For total revenues Line, one convenient starting point is \$0 revenues at 0 units sold. Slope of total revenues line is *selling price*.

**i. Units Needed to Breakeven for a Single Product**

We can derive the breakeven equation by starting with the fact that total revenue equal total cost at the breakeven point. Then the equation is restated in terms of unit sales, unit prices and unit cost and then rearranged into the more convenient format presented in equation 1.

Total Revenues = Total Costs

$$Q (SPU) = Q (VCU) + TFC$$

$$Q (SPU - VCU) = TFC$$

$$Q (CMU) = TFC$$

$$TCM = TFC$$

$$Q = TFC/CMU \text{ ----- (1)}$$

Equation 1 shows that the breakeven point is where total contribution margin [Q (SPU – VCU)] is equal to total fixed costs, i.e., this level of production and sales provides just enough revenue to cover all the cost.

**ii. Breakeven Point in Dollars for a Single Product**

The equation for the breakeven point in sales dollars may also be derived by equating total revenue and total cost.

Total Revenues = Total Costs

Total Revenues = Total Variable Costs + Total Fixed Costs

Since the variable cost ration (VCU÷SPU) multiplied by total revenues equals’ total variable cost, we can substitute (VCU÷SPU) TR for variable cost in the equation above as follows:

$$\text{Total Revenues} = (VCU/SPU) \text{ TR} + \text{Total Fixed Costs}$$

Then subtracting variable cost from both sides of the equation provides the basic breakeven point equation in sales dollars.

$$\text{TR} - (VCU/SPU) \text{ TR} = \text{TFC}$$

Stated in words, the equation indicates that total revenue, less total variable costs, equal total contribution margin and the breakeven point is where contribution margin total is equal to total fixed cost. Since the contribution margin percentage (CM % = 1-VCU/SPU) multiplied by total revenue equals total contribution margin, it is more convenient for computational purposes to state the equation in the following manner.

$$TR - (VCU/SPU) TR = TFC$$

$$TR - (1-VCU/SPU) = TFC$$

$$TR - TR (VCU/SPU) = TFC$$

$$TR (1-VCU/SPU) = TFC$$

$$TR (CM \%) = TFC$$

$$TR = TFC/CM \%$$

### **Target Operating Income (Net Income before Taxes)**

The breakeven point tells managers how much they must sell to avoid a loss. But managers are equally interested in how they will achieve the operating income targets underlying their strategies and plans.

#### **1. Units Needed for Target Operating Income for a Single Product**

This equation can be derived from scratch in the same manner used to develop equation 1. Notice however that equation 2 may be obtained by simply adding the target operating income to the right hand side of the equation.

$$TR = TVC + TFC + Target\ OI$$

$$Q (SPU) = Q (VCU) + TFC + Target\ OI$$

$$Q (SPU - VCU) = TFC + TOI$$

$$Q (CMU) = TFC + TOI$$

$$Q = (TFC + TOI)/CMU \text{ ----- (2)}$$

#### **2. Units Needed for Target Operating Income when Target Operating Income is stated as a Percentage of Sales \$ for a Single Product**

If we use ROR to define target rate of return on sale; ROR = Target OI/ Total Revenues i.e., Target OI = ROR (TRs); then we can substitute ROR (SPU x Q) for the target operating income in equation 2. This provides equation 3.

$$Q (SPU - VCU) = TFC + TOI$$

$$Q (SPU - VCU) = TFC + ROR (SPU \times Q)$$

$$Q (SPU - VCU)/(SPU - VCU) = TFC + ROR (SPU \times Q)/(SPU - VCU)$$

$$Q = TFC + ROR (SPU \times Q)/SPU - VCU)$$

$$Q = \frac{TFC + ROR (SPU \times Q)}{CMU} \text{ .....(3)}$$

$$CMU$$

Since (SPU x Q) equals sales dollars, then ROR multiplied by (SPU x Q) will provide target OI. Although the desired profit is often stated as a percentage, ROR is proportion, i.e., it ranges from 0 to 1.

### 3. *Total Revenue Needed for Target Operating Income*

Although we could derive this equation from scratch, the fact that total contribution margin must be equal to the total fixed costs plus target operating income allows us to develop equation 2 by simply adding the target operating income to equation 1.

Total Contribution Margin = Total Fixed Costs + target OI

TR (CM %) = TFC + Target OI

$$TR = \frac{TFC + Target\ OI}{CM\%}$$

### 4. *Total Revenue needed when Target Operating Income is Stated as a Percentage of Sales \$*

To solve a problem in sales dollars, when the target operating income is stated as a percentage of sales dollars, substitute (Total revenue x ROR) in equation 2 for target operating income as follows:

*Total Revenue (CM %) = TFC + Target Operating Income*

*TR (CM %) = TFC + TR (ROR)*

*TR = (TFC + TR (ROR))/CM%*

### **Target Net Income (or Net Income after Taxes) and Income Taxes**

Objective 4: Understand how income taxes affect CVP analysis. Thus far, we have ignored the effect of income taxes in our CVP analysis. At times, managers want to know the effect of their decisions on income after taxes. Net income is operating income minus income taxes. CVP calculations for target income must then be stated in terms of target net income instead of target operating income.

#### 1) **Units needed for Target Net Income**

*If TR = the tax rate, and TNI = Target Net Income, then*

*Target NI = Target OI – (Target OI x Tax Rate)*

*Target NI = Target OI (1- Tax Rate)*

**Target OI = Target NI / (1-Tax Rate)**

Substituting Target NI / (1-Tax Rate) for target OI in equation 2, provides equation 3, which allows us to solve for units needed to generate a target NI.

*Q (SPU – VCU) = TFC + (Target NI/(1-Tax Rate))*

*Q = [TFC + (Target NI/(1-Tax Rate))]/(SPU – VCU)*

*Q = [TFC + (Target NI/(1-Tax Rate))]/CMU*

## 2) Units needed for Target Net Income When Target NI is stated as a Percentage of Sales \$

If the target rate of return is stated as an after tax rate, i.e.,  $ROR = \text{Target NI} / \text{Total Revenue}$ , then the following approach is used. Substituting  $ROR (SPU \times Q) / (1 - \text{Tax Rate})$  for  $ROR (SPU \times Q)$  in equation 4 provides equation 5.

$$Q (SPU - VCU) = TFC + [ROR (SPU \times Q) / (1 - \text{Tax Rate})]$$

$$Q = TFC + [ROR (SPU \times Q) / (1 - \text{Tax Rate})] / (SPU - VCU)$$

## 3) Total Revenue needed for Target Net Income

Solving for total revenue needed to generate a target net income involves substituting  $\text{Target NI} / (1 - \text{Tax Rate})$  for target operating income in the equation for sales dollars needed for target OI (i.e., equation 2). This provides equation 3.

$$\text{Total Revenues (CM \%)} = TFC + (\text{Target NI} / (1 - \text{Tax Rate}))$$

$$\text{Total Revenues} = TFC + [(\text{Target NI} / (1 - \text{Tax Rate}))] / \text{CM \%}$$

## 4) Total Revenue needed when Target NI is stated as a Percentage of Sale \$

When the target net income is stated as an after tax rate (ROR), the equation needed is developed by simply dividing  $ROR (\text{Total Revenue})$  in equation 3 by  $(1 - \text{Tax Rate})$

$$TR (\text{CM \%}) = TFC + [ROR (TRs) / 1 - \text{Tax Rate}]$$

$$\text{Total Revenue} = [TFC + ROR (TR) / (1 - \text{Tax Rate})] / \text{CM \%}$$

Note that no income taxes are paid at the breakeven point (BEP), income taxes do not affect the BEP. An increase in income tax rates, however, would increase the number of units that must be sold to generate a given net income (NI).

## Effects of Sales Mix on Income

CVP analysis can be applied to a company producing multiple products by assuming the sales mix of products sold remains constant as the total quantity of units sold changes. In other words, we must assume a stable sales mix. Sales mix is the quantities of various products (or services) that constitute total unit sales of a company. There is no unique breakeven number of units for a company producing multiple products. Few companies produce or sell only one product. CVP analysis techniques can be utilized by managers to determine the impact of proposed changes to the current product mix. Multiplying contribution margin per product by the percentage of total sales for each product yields a single weighted-average contribution margin per unit which is then plugged into the CVP analysis to determine breakeven point and target-income activity levels. Managers calculate the weighted-average

contribution margin for each different proposed product mix and then compare the CVP analysis results for each proposed product mix to determine which product mix should be produced or sold.

**i) Units Needed for Break-even for Multiple Products**

$$TR - TVC - TFC = 0$$

$$(WASPU \times Q) - (WAVCU \times Q) = TFC$$

$$Q (WASPU - WAVCU) = TFC$$

$$Q (WACMU) = TFC$$

$$Q = TFC / WACMU$$

**ii) Total Revenues needed for Breakeven point for a Multiple Products**

$$TR - TVC - TFC = 0$$

$$TR - TR (VC \%) = TFC$$

$$TR (1 - VC \%) = TFC$$

$$TR (CM \%) = TFC$$

$$TR = TFC / CM \%$$

**iii) Units needed for Target Net Income for Multiple Products**

The equation for mixed units needed to generate a desired after tax profit is developed by substituting Target NI/ (1-Tax Rate) for Target Operating income in equation 2.

Total Contribution Margin = Total Fixed Cost + Target OI

$$Q (WACMU) = TFC + Target NI / (1 - Tax Rate)$$

$$Q = \frac{TFC + \underline{Target Net Income}}{WACMU} \times \frac{1}{1 - Tax Rate}$$

**iv) Units needed for Target Net Income when Target NI is stated as a Percentage of Sales \$ for Multiple Products**

The appropriate equation for after tax net income is found by dividing the term [(ROR) (Q x WAP)], in equation 4, by 1-Tax Rate.

*Total Contribution Margin = Total Fixed Cost + Target OI*

*Q (WACMU) = TFC + Target NI/ (1-Tax Rate)*

*Q (WACMU) = TFC + ((ROR) (WAP x Q))/ (1-Tax Rate)*

*TFC + (ROR) (WAP x Q)*

*Q =  $\frac{1-Tax Rate}{WACMU}$*

*WACMU*

Where WAP = Weighted Average Price =  $\sum [SPU_i] (M_i)$

WACMU =  $\sum [CMU_i] (M_i)$

Remember that it is usually best for computational purposes to leave the amount represented by WACMU on the left hand side in equations until the expression on the right hand side has been simplified. Also remember that the units for individual products (Q<sub>i</sub>) are always found by multiplying the total mixed units (Q) by the mix ratios (M<sub>i</sub>) for each product.

**v) Total Revenue Needed for Target NI for Multiple Products**

Revising the previous equation to indicate after tax profit we have:

Total Contribution Margin = Total Fixed Cost + Target OI

Total Contribution Margin = TFC + Target NI/ (1-Tax Rate)

TR (WACMR) = Total Fixed Cost + Target NI

1-Tax Rate

*TR = Total Fixed Cost + Target NI*

*1-Tax Rate*

*WACMR*

**vi) Total Revenue Needed for Target NI when Target NI is stated as a Percentage of Sales**

**\$ for Multiple Products**

If ROR is used as the after tax target rate of return on sales, i.e., Target NI ÷ Total Revenue, the equation becomes,

Total Contribution Margin = Total Fixed Cost + Target OI

Total Contribution Margin = TFC + Target NI/ (1-Tax Rate)

TR (WACMR) = Total Fixed Cost + (ROR) (Total Revenue)

1-Tax Rate

*TR = Total Fixed Cost + (ROR) (Total Revenue)*

*1-Tax Rate*

*WACMR*

## **Sensitivity Analysis (or What-if Analysis) and Uncertainty**

Before choosing strategies and plans about how to implement strategies, managers frequently analyze the sensitivity of their decisions to changes in underlying assumptions.

**Sensitivity analysis**- is a “what-if” technique that managers use to examine how a result will change if the original predicted data are not achieved or if an underlying assumption changes.

In the context of CVP analysis, sensitivity analysis answer such questions as,

- ✚ What will operating income be if the quantity of units sold decreases by 5% from the original prediction?
- ✚ What will operating income be if variable cost per unit increases by 10 percent?

The sensitivity of operating income to various possible outcomes broadens managers` perspectives about what might actually occur before they make cost commitments. Another aspect of sensitivity analysis is margin of safety, which is the amount of budgeted revenues over and above breakeven revenues. Expressed in units, margin of safety is the sales quantity minus the breakeven quantity.

The margin of safety answers the ‘what-if’ question: If budgeted revenues are above breakeven and drop, how far they can fall below budget before the breakeven point is reached? Such a fall could be due to a competitor introducing a better product, to poorly executed marketing programs, and so on.

The margin of safety (MOS) for any sales level represents the amount of sales dollars above or below the breakeven point. Mathematically, the margin of safety is:

$$\text{Margin of Safety (MOS)} = \text{Budgeted Revenues} - \text{Breakeven Revenues}$$

$$\text{Margin of Safety (in units)} = \text{Budgeted Sales (units)} - \text{Breakeven Sales (units)}$$

- ✓ When sales are above the breakeven point, the margin of safety is positive.
- ✓ When sales are below the breakeven point, the margin of safety is negative.

### **Contribution Margin and Gross Margin**

$$\text{Gross Margin} = \text{Revenues} - \text{Cost of Goods Sold}$$

$$\text{Contribution Margin} = \text{Revenues} - \text{All Variable Costs}$$

Cost of goods sold in the merchandising sector is made up of goods purchased and then sold. Cost of goods sold in the manufacturing sector consists entirely of manufacturing costs

(including fixed manufacturing costs). The phrase “all variable costs” refers to variable costs in all of the business functions of the value chain.

Service sector companies can compute a contribution margin but not gross margin. That`s because service-sector companies do not have a cost of goods sold line item in their income statement.

### **Summary**

Cost-volume-profit analysis is a study of the relationship between cost, volume, and profit. It examines the behavior of total revenues, total costs, and operating income as changes occur in the output level (volume), selling price, variable costs per unit, or fixed costs. Breakeven point is that quantity of output sold at which total revenues equal total costs. There are three methods to express CVP relationships: the equation method; the contribution margin method and the graphic method.

## CHAPTER V

### MASTER BUDGET

#### Section content

- Definition of Budgets
- Budgeting Cycle and Master Budget
- Types of Budgets
- Advantages of Budgets
- Limitations of Budgets
- Assumptions of Master Budget
- Types of master budget
  - Operating budget
  - Financial budget

#### Definition of budget

**Budget:** is the quantitative expression of a proposed plan of action by management for a specified period. It also aids in coordinating what needs to be done to implement that plan. A budget can cover both financial and non-financial aspects of the plan and serves as a blueprint for the company to follow in an upcoming period. A budget that covers financial aspects quantifies management's expectations regarding income, cash flows, and financial position. For example, a budgeted income statement, a budgeted statement of cash flows, and a budgeted balance sheet. Budgets can also be non-financial budgets, for, say, units manufactured or sold, number of employees, and number of new products being introduced to the market place.

#### Budgeting Cycle and Master Budget

Well-managed organizations usually have the following budgeting cycle:

- 1) Planning the performance of the organization as a whole, as well as its sub-units (such as departments and divisions). Management at all levels agrees on what is expected.
- 2) Providing a frame of reference, a set of specific expectations against which actual results can be compared.
- 3) Investigating variations from plans. If necessary, corrective action follows investigation.
- 4) Planning again, in light of (considering) feedback and changed conditions.

The preceding four steps describe the ongoing budget process. The working document at the core of this process is called the master budget. The master budget expresses management's operating and financial plans for a specified period (usually a fiscal year), and it includes a set of budgeted financial statements. The master budget is the initial plan of what the company intends to accomplish in the budget period. The master budget evolves from both operating and financial decisions made by managers.

- **Operating decisions:** deal with how to best use the limited resources of an organization.
- **Financial decisions:** deal with how to obtain the funds to acquire those resources.

## Types of Budgets

### [A]. Master Budget (Financial Plan) is:

- ✓ A comprehensive expression of management's operating and financial plans for a future time period (usually a year) that is summarized in a set of budgeted financial statements.
- ✓ It is a comprehensive budget that expresses the overall business plan for the whole organization for a period of one year or less. It is essentially a more extensive analysis of the first year of the long-range plan. It summarizes the planned activities of all sub units of an organization-sales, production, distribution, and finance.
- ✓ The master budget is a summary of all phases of a company's plans and goals for the future. It quantifies targets for sales, cost driver activity, purchase, production, net income, cash position and other objectives that management specifies. It expresses these amounts in the form of forecasted financial statements and supporting operating schedules. These supporting schedules provide the information that is to highly detailed to appear in the actual financial statements. Thus, a master budget is a periodic business plan that includes a coordinated set of detailed operating schedules and financial statements. It includes forecast of sales, expense, cash receipts and disbursements, and balance sheet. A master budget is also called pro forma statements, the term used for forecasted financial statements.

### [B]. Continuous/Perpetual/Rolling Budget:

It is budget that covers a 12-month period but which is constantly adding a new month on the end as the current month's completed. It is a common form of master budget. It makes the budgeting an ongoing process rather than a periodic process. Advocates of continuous budgets states that this approach to budgeting is superior to other approaches in that it keeps management thinking and planning a full 12 months ahead and thus maintains a stable planning horizon. Thus, continuous budget stabilizes the planning horizon. As managers add a new 12<sup>th</sup> month to a continuous budget, they may update the other 11 months as well. Then they can compare actual monthly results with both the original plan and the most recently revised plan. Under other budget approaches, the planning horizon becomes shorter as the year progresses.

## Advantages of Budgets

A budget is a formal business plan. All managers do some kind of planning. Sometimes plans are unwritten. Such plans might work in a small organization, but as an organization grows, informal planning is not enough. A more formal plan- budgetary system- becomes a necessity. Since budgets forces managers to think ahead to anticipate and prepare for changing conditions, it allows systematic rather than chaotic reaction to change. It helps to adjust the firm's plan to changing conditions.

Budgets are an integral part of management control systems. When administered thoughtfully by managers, budgets:

- ◆ *Formalize planning*
- ◆ *Promote coordination and communication among subunits within the company*
- ◆ *Provide a framework for judging performance*
- ◆ *Motivate managers and other employees*

## **Formalization of planning**

Budgets formalize plans, it compels (forces) managers to think ahead, to anticipate and prepare for changing conditions. The budgeting process makes planning an explicit management responsibility. In such conditions, managers are forced to react to current events rather than planning for future. To prepare a budget, a manager should set goals and objectives and establish policies to aid their achievement. The objectives are the destination points, and budgets are the road maps guiding to those destination. Without goals and objectives, company operations lack directions, problems are not foreseen, and results are difficult to interpret afterwards.

## **Framework for Judging Performance**

Plans enable a company's manager's to measure actual performance against budgets. Budgets can overcome two limitations of using past performance as a basis for judging actual results. One limitation is that past results often incorporate past miscues (mistakes) and substandard performance. The other limitation of using past performance is that future conditions can be expected to differ from the past. However, it is important to remember that a company's budget should not be the only benchmark used to evaluate performance. Many companies also consider performance relative to peers as well as improvement over prior years. The problem with evaluating performance relative only to a budget is it creates an incentive for subordinates to set a target that is relatively easy to achieve. Of course, managers at all levels recognize this incentive, and therefore they work to make the budget more challenging to achieve for the individuals who report to them. Negotiations occur among managers at each of these levels to understand what is possible and what is not. The budget is the end product of these negotiations.

## **Communication and Coordination**

Budgets tell employees what is expected of them. Nobody likes to drift along, not knowing what the boss expects or hopes to achieve. A good budget process communicates both from the top down and from the bottom up. Top management makes clear the goals and objectives of the organization in its budgetary directives. Employees and lower level managers then inform higher level managers how they plan to achieve the goals and objectives. Budgets also help managers in coordinating their efforts, so that the objectives of the organization as a whole match the objectives of its parts. Once the organization's overall goals have been communicated to each department's budget and for coordinating it with the budgets of other department's. For example, a budget forces purchasing department to integrate (incorporate) its plan with plan of the production department, it forces production department to consider the delivery schedule set by sales department.

Similarly, financial officers use the sales budget, purchasing requirements, and so forth to anticipate the company's need for cash. Therefore, the budgetary process enhances communication and coordination among departments. Coordination is meshing and balancing all aspects of production or service and all departments in a company in the best way for the company to meet its goals. Communication is making sure those goals are understood and accepted by all employees. Coordination forces executives to think of relationships among individual departments and the company as a whole, and across companies.

## **Motivating Managers and Other Employees**

Research shows that challenging budgets improve employee performance. That's because falling short of budgeted numbers is viewed by employees as a failure. Most employees are motivated to work more intensively to avoid failure than to achieve success. As employees get closer to a goal, they work harder to achieve it. Therefore, many executives like to set demanding but achievable goals for their subordinate managers and employees. Creating a little anxiety improves performance, but overly ambitious and unachievable budgets increase anxiety without motivation that's because employees see little chance of avoiding failure.

## **Limitations of Budgets**

There are several limitations and problems associated with the master budget that need to be considered by management. These problems involve uncertainty, behavioral bias and costs.

- ✓ **Uncertainty:** Budgeting includes a considerable amount of forecasting and this activity involves a considerable amount of uncertainty.
- ✓ **Behavioral Bias:** A second problem involves a variety of behavioral conflicts that are created when the budget is used as a control device. To be effective, the budget must be used by the managers it is designed to help. Thus, it must be acceptable to all levels of management. The behavioral literature on budgeting supports the view that the budget should reflect what is most likely to occur under efficient operating conditions. If a budget is to be used as an effective planning and monitoring device, it should encourage a high level of performance and efficiency, but at the same time, it should be fair and obtainable. If the budget is viewed by managers as unfair, (too optimistic) it may intimidate (frighten) rather than motivate. One way to gain acceptance is referred to as participative (rather than imposed) budgeting. The idea is to include all levels of management in the budget preparation process.
- ✓ **Costs:** A third problem or limitation is that budgeting requires a considerable amount of time and effort. Many companies maintain a twelve month budget on a continuous basis by adding a future month as the current month expires. While this does not create a major expenditure for large or medium sized organizations, smaller companies may find it difficult to justify the costs involved. Many small, potentially profitable firms do not plan effectively and eventually fail as a result. Cash flow problems are common, e.g., not having enough cash available (or accessible through a line of credit with a bank) to pay for merchandise or raw materials or to meet the payroll. Many of these problems can be avoided by preparing a cash budget on a regular basis.

## **The Assumptions of the Master Budget**

Typically, the following simplifying assumptions are made when preparing a master budget:

1. Sales prices are constant during the budget period,
2. Variable costs per unit of output are constant during the budget period,
3. Fixed costs are constant in total and
4. Sales mix is constant when the company sells more than one product. These assumptions facilitate the planning process by removing many of the economic complexities.

## Types of Master Budget

The master budget comprises the financial projections of all the individual budgets for a company for a specified period, usually a fiscal year. Master budget can be classified into two: operating and financial budget.

- **Operating budget:** budgeted income statement and its supporting budget schedules.
- **Financial budget:** part of the master budget that focuses on how operations and planned capital outlays affect cash. It is made up of the capital expenditures budget, the cash budget, the budgeted balance sheet, and the budgeted statement of cash flows.

### 1) The Operating Budget

Preparing an operating budget is a sequential process of developing nine sub-budgets. Except for one or two exceptions the sub-budgets must be prepared in the following order: sales, production, direct materials, direct labor, and factory overhead, ending inventory, cost of goods sold, selling and administrative and income statement.

#### [A]. Step 1: Revenues or Sales Budget

A revenue (sales) budget is the usual starting point for budgeting. That's because the production level and the inventory level and hence manufacturing costs as well as non-manufacturing costs, generally depend on the forecasted level of sales or revenues.

Many factors influence the sales forecast, including the sales volume in recent periods, general economic and industry conditions, market research studies, productive capacity, pricing policies, advertising and sales promotions, backlog of unfilled sales orders, competition, and regulatory policies. Developing a sales budget involves the following calculations:

$$\begin{aligned} & \text{Budgeted Sales \$} \\ & = \text{Budgeted Unit Sales} \times \text{Budgeted Sales Prices} \end{aligned}$$

The revenue budget is often the outcome of elaborate information gathering and discussions among sales managers and sales representatives who have a detailed understanding of customer needs, market potential, and competitors' product. Statistical approaches such as regression and trend analysis can also help in sales forecasting. These techniques use indicators of economic activity and past sales data to forecast future sales. Managers should use statistical analysis only as one input to forecast sales. In the final analysis, the sales forecast should represent the collective experience and judgment of managers.

The usual starting point for step 1 is to base revenues on expected demand. Occasionally, a factor other than demand limits budgeted revenues. For example, when demand is greater than available production capacity or a manufacturing input is in short supply, the revenues budget would be based on the maximum units that could be produced. Why? Because sales would be limited by the amount produced. Sales budget is accompanied by cash collection budget.

$$\begin{aligned} & \text{Current Period Cash Collections} \\ & = (\text{Current Period Cash Sales} + \text{Current Period Credit Sales Collected in Current Period} + \\ & \quad \text{Prior Period Credit Sales Collected in Current Period}) \end{aligned}$$

These calculations are relatively simple, but where does the budget director obtain this information? Well, sales forecasting is a marketing function. Sales estimates are frequently

generated by the company's sales representatives who discuss future needs with customers (wholesalers and retailers). Statistical forecasting techniques can also be used to make estimates of expected future sales, considering the company's previous sales performance and various assumptions about the future economic climate, and the actions of competitors and consumers. Pricing is also a marketing function, but many prices are based on costs plus a markup (the supply function) and consideration of what consumers are willing and able to pay for the product (the demand function). Thus, the budgeted sales price is usually determined after the budgeted unit cost has been calculated.

The information needed to develop an equation for collections is provided by the finance department and is normally based on past experience. These calculations are somewhat more involved than they appear to be in the equation above because of the effects of cash discounts and the time lags between credit sales and collections. Cash discounts are frequently used to speed up cash inflows. This puts the funds back to work sooner and reduces the need for short term loans. However, even with a generous cash discount for prompt payment, collections for credit sales are typically spread out over several months.

#### **[B]. Step 2: Production Budget (In units)**

After the revenues are budgeted, the manufacturing manager prepares the production budget. The total finished goods units to be produced depend on budgeted sales and expected changes in inventory levels.

► Preparing a production budget includes consideration of the desired inventory change as follows:

$$\begin{aligned} & \textit{Units to be produced} \\ & = (\textit{Budgeted Unit Sales} + \textit{Target (Desired) Ending Finished Goods Inventory in units} \\ & \quad - \textit{Beginning Finished Goods Inventory in units}) \end{aligned}$$

The desired ending inventory is usually based on the next period's sales budget. Considerations involve the time required to produce the product, (i.e., cycle time or lead time) as well as setup costs and carrying costs, the costs that arise while holding an inventory of goods for sale. Carrying costs include the opportunity cost of the investment tied up in inventories and the costs associated with storage, such as insurance, obsolescence, spoilage, and shrinkage resulting from theft). In a just-in-time environment the desired ending inventory is relatively small, or theoretically zeros in a perfect situation.

The nature of the product makes it difficult for some companies to synchronize production levels with expected sales. When inputs are available only seasonally, production occurs "in season." For example, a manufacturer of jellies makes the year's supply of strawberry jelly during strawberry harvest season.

#### **[C]. Step 3: Direct Materials Usage and Direct Materials Purchase Budget**

- ✓ Once we determine the number of units to be produced from the production budget, we can budget for the manufacturing inputs: direct materials, direct labor, and overhead.

- ✓ The number of units to be produced is the key to computing the usage of direct materials in quantities and in dollars. The direct material quantities used depend on the efficiency with which materials are consumed to produce a product. Manufacturing managers are constantly seeking ways to make process improvements that increase quality and reduce waste, which reduces direct material usage and costs.

**The direct materials budget includes five separate calculations**

$$\begin{aligned} & \textit{Quantity of Material Needed for Production (Direct Materials Used in Production)} \\ & = (\textit{Units to be Produced} \times \textit{Quantity of Material Budget per Unit}) \end{aligned}$$

The quantity of material required per unit of product is determined by the industrial engineers who designed the product. Materials requirements are frequently described in an engineering document referred to as a "bill of materials".

$$\begin{aligned} & \textit{Quantity of Material to be Purchased (Or Purchases of Direct Materials)} \\ & = (\textit{Quantity of Material Needed for Production} + \textit{Target Ending Inventory of Direct} \\ & \quad \textit{Materials} - \textit{Beginning Inventory of Direct Materials}) \end{aligned}$$

The purchasing manager prepares the budget for direct material purchases. The desired ending materials quantity is normally based on the next period's (month's) materials needed for production and this amount depends on the third period's budgeted unit sales. Of course inventories of raw materials (just like finished goods) are kept to a minimum in a JIT environment. Factors that influence the desired inventory levels include the reliability of the company's suppliers, as well as ordering and carrying costs.

$$\begin{aligned} & \textit{Budgeted Cost of Material Purchases} \\ & = \textit{Quantity of Direct Material to be Purchased} \times \textit{Budgeted Material Prices} \end{aligned}$$

This amount is needed to determine cash payments. Once the quantity to be purchased has been determined, the cost of purchases is easily calculated. Budgeted material prices are provided by the purchasing department.

$$\begin{aligned} & \textit{Cost of Material Used} \\ & = \textit{Quantity of Material Needed for Production} \times \textit{Budgeted Material Prices} \end{aligned}$$

The cost of materials used is needed in the cost of goods sold budget below.

$$\begin{aligned} & \textit{Cash Payments for Direct Material Purchases} \\ & = \textit{Current Period Purchases Paid in Current Period} + \textit{Prior Period Purchases Paid} \\ & \quad \textit{in Current Period} \end{aligned}$$

The information needed to determine budgeted cash payments is provided by accounting, (accounts payable) and is usually based on past experience. Normally the budget should reflect a situation where the company pays promptly to take advantage of all cash

discounts allowed, thus cash payments for direct materials purchases may be equal to budgeted cost of material purchases.

**[D]. Step 4: Direct Manufacturing Labor Cost Budget**

These costs depend on wage rates, production methods, and hiring plans. The manufacturing manager prepares the budget for direct manufacturing labor. Fewer calculations are needed for direct labor than for direct materials because labor hours cannot be stored in the inventory for future use. Time can be wasted, but not postponed.

$$\begin{aligned} & \textit{Direct Labor Hours Needed for Production} \\ & = \textit{Units to be Produced} \times \textit{Direct Labor Hours Budgeted per Unit} \end{aligned}$$

The amount of direct labor time needed per unit of product is determined by industrial engineers. Estimates are frequently made using a technique referred to as motion and time study. This involves measuring each movement required to perform a task and then assigning a precise amount of time allowed for these movements. The cumulative time measurements for the various tasks required to produce a product provide the estimate of a standard time per unit. There are alternative techniques that are less expensive, but motion and time study provides estimates that are very precise. Learning curves provide another quantitative technique that is helpful in establishing labor standards.

$$\begin{aligned} & \textit{Budgeted Direct Labor Cost} \\ & = (\textit{Direct Labor Hours Needed for Production} \times \textit{Budgeted Rates per Hour}) \end{aligned}$$

The budgeted rates per hour for direct labor are provided by the human resource department. Frequently the labor (union) contract provides the source for this information. Many different types of labor may be required with different levels of expertise and experience.

**[E]. Step 5: Manufacturing Overhead Costs Budget**

The total of these costs depends on how individual overhead costs vary with respect to the cost driver, which is a variable, such as level of activity or volume that casually affects costs over a given time span.

$$\begin{aligned} & \textit{Budgeted Factory Overhead Costs} \\ & = ((\textit{Budgeted Fixed Overhead Cost} + (\textit{Budgeted Variable Overhead Rate} \times \textit{Direct Labor} \\ & \quad \textit{Hours Needed for Production})) \end{aligned}$$

This is a cumulative equation that combines the equations for the company's various types of indirect resources. Keep in mind however, that although many companies are still using a single production volume based measurement for overhead allocations, most companies use departmental rates and many companies are now using activity based rates.

The calculation for cash payments reflects one of the differences between cash flows and accrual accounting. Since some costs, like depreciation, do not involve cash payments in the

current period, these costs must be subtracted from the total overhead costs to determine the appropriate amount.

***Cash Payments for Overhead***

**= Budgeted Factory Overhead Cost – Depreciation and Other Costs that do not require cash payments**

**[F]. Step 6: The Ending Inventories Budget**

The management accountant prepares the ending inventories budget. The dollar amount for the ending inventory of finished goods is needed below to determine cost of goods sold. The dollar amounts for ending direct materials and finished goods are needed for the balance sheet.

***Ending Direct Materials***

**= Desired Ending Materials X Budgeted Prices**

***Budgeted or Standard Unit Cost***

**= (Quantity of D.M. Required per Unit x Budgeted Prices) + (D.L. Hours Required per Unit x Budgeted Rate) + (Total Overhead Rate x D.L. Hours Required per Unit)**

The budgeted or standard unit cost can be calculated at any time after the budgeted quantities per unit and input prices are obtained. The calculation is placed here because it is needed for determining finished goods.

***Ending Finished Goods***

**= Desired Ending Finished Goods x Budgeted Unit Cost**

**[G]. Step 7: Cost of Goods Sold Budget**

Cost of goods sold is needed for the income statement. One method of determining budgeted COGS involves accumulating the amounts from the previous sub-budgets as follows.

- ❖ ***Budgeted Total Manufacturing Cost (Cost of Goods Manufactured)***  
**= Cost of Direct Material Used + Cost of Direct Labor Used + Total Factory Overhead Costs**
  
- ❖ ***Cost of Goods Available for Sale***  
**= Beginning Finished Goods Inventory + Budgeted Total Manufacturing Cost**
  
- ❖ ***Budgeted Cost of Goods Sold***  
**= (Budgeted Total Manufacturing Cost + Beginning Finished Goods – Ending Finished Goods)**

This is the same approach used in determining cost of goods sold, but when developing a budget we typically assume no change in Work in Process. Therefore, budgeted cost of goods manufactured is equal to budgeted cost of goods sold.

#### **[H]. Step 8: Selling and Administrative Expense Budget (Nonmanufacturing Costs Budget)**

The preparation of the selling and administrative expense budgets is very similar to the approach used for factory overhead.

$$\begin{aligned} & \textit{Budgeted Selling and Administrative Expenses} \\ & = \textit{Budgeted Fixed Selling \& Administrative Expenses} + (\textit{Budgeted Variable Rate as a} \\ & \quad \textit{Proportion of Sales \$ x Budgeted Sales \$}) \end{aligned}$$

$$\begin{aligned} & \textit{Cash Payments for Selling \& Administrative Expenses} \\ & = \textit{Budgeted Selling \& Administrative Expenses} - \textit{Depreciation and other cost which do not} \\ & \quad \textit{require cash payments} \end{aligned}$$

#### **[I]. Step 9: Budgeted Income Statement**

Preparing the budgeted income statement involves combining the relevant amounts from the sales, cost of goods sold and selling and administrative expense budgets and then subtracting interest, bad debts and income taxes to obtain budgeted net income. These amounts are provided by the finance department.

- a. *Budgeted Sales \$ - Budgeted Cost of Goods Sold = Budgeted Gross Profit*
- b. *Budgeted Gross Profit - Budgeted Selling \& Administrative Expenses = Operating Income*
- c. *Operating Income - Interest Expense - Bad Debts Expense = Net Income Before Taxes*
- d. *Net Income before Taxes – Income Taxes = Net Income after Taxes*

#### **2) The Financial Budget**

The financial budget includes the cash budget, the capital expenditure budget, which summarizes plans for acquiring fixed assets), the budgeted balance sheet and budgeted statement of cash flows. The cash budget and budgeted balance sheet are discussed below.

#### **[A]. Cash Budget**

The cash budget is a statement (schedule) of expected (planned) cash receipts and disbursements (payments). It predicts the effects on the cash position at the given level of operations. It is highly affected by the level of operations summarized in budgeted income statement. Cash budgets are very helpful for cash planning and control. Cash budgets help avoid unnecessary idle cash and unexpected cash deficiencies. They thus keep cash balance in line with needs. The cash budget has the following four major sections:

I. **The Receipts Sections:** It consists of operating cash balance added to whatever is expected in the way to cash receipts during the budget period. The beginning cash balance plus cash receipts equals the total cash available before financing.

$$\text{Budgeted Cash Available} = \text{Beginning Cash Balance} + \text{Budgeted Cash Collections}$$

Cash receipts depend on the *collections of accounts receivable, cash sales, and miscellaneous recurring sources, such as rental and royalty receipts*. Information on the expected collectability of accounts receivable is needed for accurate predictions. Key-factors include bad-debt (uncollectible accounts) experience and average time lag between sales and collections.

II. **The Cash Disbursements (Requirements Section):** It consists of all cash requirements that are planned for the budget period. Cash disbursements include payments for:

- Direct materials purchases
- Direct labor and other wages and salary outlays
- Interest on long term borrowings
- Income tax payments
- Dividend payments
- Outlays for property, plant, equipment and other long-term investments
- Desired cash balance

III. **The Excess or Deficiency Section:** It consist the difference between cash receipts section and cash disbursements section.

$$\text{Budgeted Cash Excess or Deficiency} = \text{Budgeted Cash Available} - \text{Budgeted Cash Payments}$$

#### IV. The Financing section

Short term financing requirements depend on how the total cash available for needs compares with the total cash disbursements plus the minimum ending cash balance desired. The financing plans will depend on the relationship between total cash available for needs and total needed.

- If there is a deficiency of cash, loans will be taken (obtained).
- If there is excess cash, any outstanding loans will be repaid.

$$\text{Ending Cash Balance} = \text{Cash Excess or Deficiency} + \text{Borrowings} - \text{Repayments including Interest}$$

#### [B]. Budgeted Balance Sheet

Preparing the budgeted balance sheet involves accumulating information from the previous period's balance sheet, the various operating sub-budgets, the cash budget and other accounting records.

##### Assets

###### a. Current Assets:

- ✓ Cash (from the cash budget)
- ✓ Accounts Receivable (from the sales budget and previous balance sheet)
- ✓ Direct materials (from the ending inventory budget)
- ✓ Finished goods (from the ending inventory budget)

**b. Long Term Assets:**

- ✓ Land (from previous balance sheet and budgeted activity)
- ✓ Buildings (from previous balance sheet and budgeted activity)
- ✓ Equipment (from previous balance sheet and budgeted activity)
- ✓ Accumulated depreciation (from the accounting records)

**Liabilities**

Liabilities includes current liabilities (such as accounts payable (from various operating sub-budgets), taxes payable (from income statement)) and long term liabilities

Shareholders' equity includes both common stock (from previous balance sheet and budgeted activity) and retained earnings (from previous balance sheet and income statement)

**Illustration**

The Expando Company produces entertainment centers from a type of pressed wood referred to as particle board. Other materials, such as glue and screws are viewed as insignificant and are charged to overhead as indirect materials. Budgeted or standard quantities allowed per unit along with the budgeted prices and rates are as follows:

Type of input	Inputs per output	Cost per input	Cost per output
Direct materials	2 particle board sheets*	\$10	\$20
Direct labor	0.4 hours	15	6
Factory overhead:			
Variable	0.4 hours	30	12
Fixed	0.4 hours	50	<u>20</u>
			<b>\$58</b>

\* Particle board is purchased in sheets that are 3/4" by 4' by 8'.

Overhead rates are based on 4,800 standard direct labor hours per month, or average monthly production of 12,000 units, i.e.,  $(0.4)(12,000) = 4,800$  hours. Desired ending inventories are 10% of next period's material needs for direct material and 5% of next period's sales for finished goods. Unit Sales are budgeted as follows for the first six months of the year.

January	February	March	April	May	June
9,000	10,000	11,000	12,000	14,000	14,500

The budgeted sales price is \$100 per unit. Sales are budgeted as 50% cash and 50% credit sales. Past experience indicates that 80% of the credit sales are collected during the month of sale, 18% are collected in the following month, and 2% are uncollectible. A 1% cash discount is allowed to customers who pay within the month the sale takes place including cash sales.

Variable selling and administrative expenses are budgeted at 10% of sales dollars. The budget for fixed selling and administrative expenses is \$50,000 per month. Cash payments are made for all expenditures made during the month except for depreciation of \$100,000 in manufacturing and \$25,000 in the selling and administrative area. The budgeted beginning cash balance for March is \$100,000 and the tax rate is 40%. Budgeted income taxes from January and February are \$200,000. This amount is to be paid at the end of March along with the current months taxes. A three month note for \$50,000 is to be repaid at the end of March. The interest rate on the note is 12 percent.

Some additional account balances budgeted for the end of February include: Land \$5,000,000, buildings and equipment \$15,000,000, accumulated depreciation \$6,000,000, other current liabilities 0, long term liabilities 0, common stock \$5,000,000 and retained earnings \$8,993,000.

**Required:** Prepare

1. Sales budget for March, including net sales dollars.
2. Calculate collections for March.
3. Production Budget, i.e., units to be produced for March.
4. Direct Material quantity needed for production for March.
5. Direct Material quantity to be purchased for March.
6. Budgeted cost of direct material purchases for March.
7. Budgeted cost of direct material used for March.
8. Direct labor needed for production for March.
9. Budgeted cost of direct labor used for March.
10. Budgeted factory overhead costs for March.
11. Budgeted cost of goods sold for March.
12. Prepare a simple Budgeted Income Statement for March.
13. Prepare a cash budget for March.
14. Budgeted Balance Sheet for March

### Solution for the Illustration

<b>Expando Company</b>			
<b>Sales Budget for March</b>			
<b>Budgeted Unit Sales</b>	<b>Budgeted Sales</b>	<b>Price</b>	<b>Total</b>
50%—cash sales	5,500	\$100	\$550,000
50%—credit sales	5,500	\$100	\$550,000
<b>Total sales</b>	<b>11,000</b>	<b>\$100</b>	<b>\$1,100,000</b>
Less: Sales discounts			9,900
[(550,000 x 0.01) + (550,000 x 0.08) x 0.01]			
<b>Net sales</b>			<b><u>\$1,090,100</u></b>

**Expando Company**  
**Cash Collection Budget for March**

Collections for March:

Current period cash sales (50% x \$1,100,000) – (0.01 x \$550,000)	\$544,500
Add: Current period credit sales collected in current period (80% x 0.5 x 1,100,000) – (440,000 x 0.01)	435,600
Prior period credit sales collected in current period (10,000 x \$100 x 0.5 x 0.18)	<u>90,000</u>
Current period cash collection	<b><u>\$1,070,100</u></b>

**Expando Company**  
**Production Budget for March**

**March   April**

Units to be produced:

Budgeted unit sales	11,000	12,000
Add: Desired ending inventory of finished goods (5% x 12,000)	600	700
Total requirements	<u>11,600</u>	<u>12,700</u>
Less: Beginning inventory of finished goods	550	600
Units to be produced	<b>11,050</b>	<b>12,100</b>

**Expando Company**  
**Direct Materials Budget for March**

**Physical unit budget:**

Quantity of DM needed for production:

Units to be produced	11,050
Times: Quantity of DM budgeted per unit	<u>2</u>
Quantity of DM needed for production	<b><u>22,100 sheets</u></b>

Quantity of DM to be purchased:

Quantity of DM needed for production	22,100
Add: Desired ending inventory of DM (10% x 24,200)	<u>2,420</u>
Total requirements	24,520
Less: Beginning inventory of DM (10% x 22,100)	<u>2,210</u>
Quantity of DM to be purchased	<b><u>22,310 PBs</u></b>

**Cost budget:**

Budgeted cost of DM used:

Quantity of DM needed for production	22,100
Times: Budgeted material prices	<u>\$10</u>
Budgeted cost of direct materials used	<b><u>\$221,000</u></b>

Budgeted cost of DM to be purchased:

Quantity of DM to be purchased	22,310
Times: Budgeted prices	<u>\$10</u>
Budgeted cost of DM purchases	<b><u>\$223,100</u></b>

*Therefore, cash payments for DM purchases = \$223,100*

*Note: April units to be produced = 12,000 + (0.05 x 14,000) – (0.05 x 12,000) = 12,100*

*April DM needed for production = (12,100 x 2) = 24,200 sheets*

**Expando Company**  
**Direct Labor Budget for March**

**DLHs needed for production:**

Units to be produced	11,050
Times: DLHs budgeted per unit	<u>0.4</u>
DLHs needed for production	<u><b>4,420</b></u>

**Budgeted DL cost:**

DLHs needed for production	4,420
Times: Budgeted rates per hour	<u>\$15</u>
Budgeted DL costs	<u><b>\$66,300</b></u>

Cash payments for DL costs = \$66,300

**Expando Company**  
**Budgeted Factory Overhead Costs Budget for March**

**Budgeted variable overhead costs:**

DLHs needed for production	4,420	Times:	
Budgeted variable OH rate		<u>\$30</u>	Budgeted
variable overhead cost		\$132,000	
Add: Budgeted fixed overhead (\$50 per hour x 4,800 denominator hours given)		<u>240,000</u>	Total
budgeted factory overhead costs		<u><b>\$372,600</b></u>	

Cash payments for OH costs = \$372,600 – \$100,000 = **\$272,600**

**Expando Company**  
**Ending Inventory Budget for March**

**Ending Direct Materials:**

Desired Ending Inventory of Direct Materials (0.10 x 24,200)	2,420 PBs
Times: Budgeted prices	<u>\$10/PBs</u>
<b>Ending Direct Materials</b>	<u><b>\$24,200</b></u>

**Ending Finished Goods:**

Desired Ending Inventory of Finished Goods (0.05 x 12,000 April budgeted unit sales)  
600 Times: Budgeted cost per unit\* **\$58** Ending Inventory of Finished Goods = **\$34,800**

**\*Budgeted or Standard Unit Cost**

= (Quantity of DM required per Unit x Budgeted Prices) + (DLHs required per Unit x Budgeted Rate) + (Total Overhead Rate x DLHs required per Unit)  
= (2 x \$10) + (0.4 x \$15) + (0.4 x \$80) = 20 + 6 + 32 = **\$58**

**Expando Company**  
**Budgeted Cost of Goods Sold for March**

**Budgeted Cost of Goods Sold:**

Beginning inventory of finished goods (0.05 x 11,000 x \$58)	\$31,900
<b>Add: Cost of Goods Manufactured:</b>	
Budgeted cost of DM used	221,000
Budgeted cost of DL	66,300
Total FOH cost	<u>372,600</u>
Cost of goods manufactured	<u>659,900</u>
Cost of goods available for sale	\$691,800
Less: Ending inventory of finished goods (0.05 x 12,000 x \$58)	<u>(34,800)</u>
Budgeted cost of goods sold	<u><b>\$657,000</b></u>

**Expando Company**  
**Selling and Administrative Expense Budget for March**

**Budgeted selling and administrative expense:**

Variable selling and administrative expense (0.10 x \$1,100,000)	\$110,000
Fixed selling and administrative expense	<u>50,000</u>
Total selling and administrative expense	<u><b>\$160,000</b></u>
Cash payments for selling and administrative expense = \$160,000 – \$25,000 = <u><b>\$135,000</b></u>	

**Expando Company**  
**Budgeted Income Statement for March**

Sales	\$1,100,000
Less: Cash discounts	<u>9,900</u>
Net sales	\$1,090,100
Less: Cost of goods sold	<u>657,000</u>
Gross profit	\$433,100
Less: Selling and administrative expenses	160,000
Bad debts expense [(\$1,100,000 x 0.5 x 0.02)]	11,000
Interest expense (\$50,000 x 0.12 x 1/12)	<u>500</u>
Net income before taxes	\$261,600
Less: Income taxes (0.40 x \$261,600)	<u>104,640</u>
Net income after taxes	<u><b>\$156,960</b></u>

Notice that bad debts are 2% of credit sales and credit sales are 50% of total sales. The interest expense is for one month's interest on the three month note.

**Expando Company**  
**Cash Budget for March**

**Cash receipts:**

Beginning cash balance	\$100,000
Cash collection	<u>1,070,100</u>
Total cash available for needs	\$1,170,100

**Less: cash requirements (payments):**

Direct materials	\$223,100
Direct labors	66,300
Factory overhead (\$372,600-\$100,000 depreciation)	272,600
Selling and administrative expense (\$160,000-\$25,000)	135,000
Income taxes (\$200,000+\$104,640)	<u>304,640</u>
Total cash needed	\$1,001,640

**Excess (deficiency):**

Total cash available – total cash needed	\$168, 460
--	------------

**Financing:**

Borrowings	0
Repayments [ $\$50,000 + (\$50,000 \times 0.12 \times 3/12)$ ]	<u>51,500</u>
Total cash increase (decrease) from financing	<u>(51,500)</u>
Ending cash balance	<u><b>\$116,960</b></u>

**Human Aspects of Budgeting**

Too often, budgeting is thought of as a mechanical tool as the budgeting techniques themselves are free of emotion. However, the administration of budgeting requires education, persuasion, and intelligent interpretation.

**Learning activity**

Student will visit to one of the business firms nearby them and indentify how budget is being prepared by the firm and relate it with the theoretical knowledge they have.

**Summary**

A budget is the quantitative expression of a proposed plan of action by management for a specified period and aid to coordinating what needs to be done to implement that plan. Budget can be classified in to two: master and continuous. When administered thoughtfully by managers, budgets formalize planning; promote coordination and communication among subunits within the company; provide a framework for judging performance and motivate managers and other employees. There are several limitations and problems associated with the master budget that need to be considered by management. These problems involve uncertainty, behavioral bias and costs.

# CHAPTER VI

## FLEXIBLE BUDGET AND VARIANCE ANALYSIS

### Section content

- The use of variances
- Static budget and flexible budgets
- Steps in developing flexible budget
- Application of standard costing in variance analysis
  - Definition of standard costing
  - Advantages of standard costing
  - Limitations of standard costing

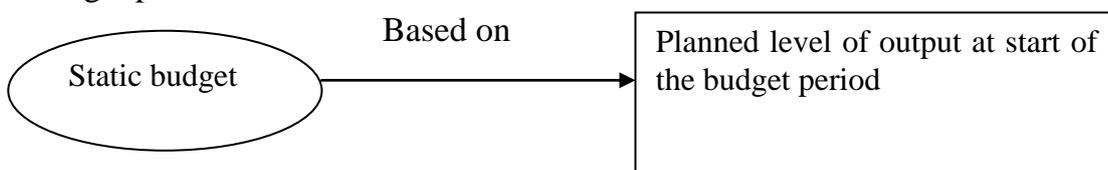
### The Use of Variances

Variance represents the difference between an amount based on an actual result and the corresponding budgeted amount. Each variance we compute is the difference between an actual result and the corresponding budgeted amount. The budgeted amount is a benchmark, a point of reference from which comparisons may be made.

Variances assist managers in their planning and control decisions. In other words, variances are where the planning and control functions come together to assist managers in implementing their strategies. Management by exception is the practice of concentrating on areas not operating as anticipated or expected (such as a cost overrun on a defense project or a large shortfall in sales of a product) and giving less attention to areas operating as anticipated or expected. In other words, managers usually pay more attention to areas with large variances. Sometimes large positive variances may occur, such as a significant decrease in manufacturing costs of a product. Managers will try to understand the reasons for this decrease, for example; better operator training or changes in manufacturing methods—so these practices can be appropriately continued. Managers use information from variances when planning how to allocate their efforts. Areas with sizable variances receive more attention by managers on an ongoing basis than do areas with minimal variances. Variances are also used in performance evaluation and to motivate managers. Sometimes variances suggest a change in strategy. Excessive defect rates for a new product may suggest a flawed product design. Managers may then want to reevaluate their product strategies.

### Static Budget and Flexible Budgets

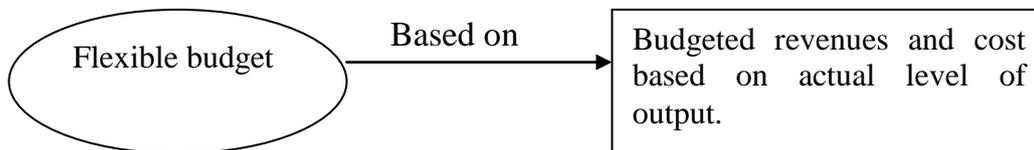
- The master budget or static budget is based on the level of output planned at the start of the budget period.



In other words, the static budget is the “original” budget. It’s static in the sense that the budget is developed for a single (static) planned output level. A static budget is prepared at the

beginning of the budgeting period and is valid for only the planned level of activity. It is suitable for planning, but it is inadequate for evaluating how well costs are controlled because the actual level of activity is unlikely to equal the planned level of activity, thus resulting in “apples-to-oranges” cost comparisons. When variances are computed from a static budget at the end of the period, adjustments are not made to the budgeted amounts for the actual output level in the budget period.

- A flexible budget (variable budget)—calculates budgeted revenues and budgeted costs based on the actual output level in the budget period.



A flexible budget is calculated at the end of the period when the actual output is known; a static budget is developed at the start of the budget period based on the planned output level for the period. A flexible budget is dynamic rather than static; it can be tailored for any level of activity within the relevant range. A relevant range is the band of normal activity level or volume in which there is a specific relationship between the level of activity or volume and the cost in question. For example, a fixed cost is fixed only in relation to a given wide range of total activity or volume (at which the company is expected to operate) and only for a given time span (usually a particular budget period). A flexible budget provides estimates of what costs should be for any level of activity within a specified range. A flexible budget is a performance evaluation tool. When used for performance evaluation purposes, actual cost are compared to what the costs should have been for the actual level of activity during the period. This enables “apples-to-apples” cost comparisons. A flexible budget enables managers to compute variances that provide more information than the information from variances in a static budget. A flexible budget can be prepared for various levels of output whereas a static budget is based on one specific level of output. A flexible budget adjusts the static budget for the actual level of output. It cannot be prepared before the end of the period.

A flexible budget asks the question: “*If I had known at the beginning of the period what my output volume (units produced or units sold) would be, what would my budget have looked like?*”

**Question:** *If the flexible budget (FB) is based on the level of output, which isn’t known until the end of the period, how can it be a budget?*

**Answer:** *The flexible budget (FB) shows the costs that should have been incurred (the budgeted costs) to achieve the actual output level. The FB is the budget we would have made at the beginning of the period if we had perfectly predicted the actual output level (i.e., the FB is the budget managers would have prepared at the beginning of the period if they had perfectly predicted the actual output level).*

Budgets, both static and flexible, can differ in the level of detail they report. Companies present budgets with broad summary figures that can then be broken down into progressively more detailed figures via computer software programs. The level of detail increases in the number of line items examined in the income statement and the number of variances computed. “Level” followed by a number denotes the amount of detail shown by a variance analysis.

- ✚ Level 0 reports the least detail.
- ✚ Level 1 offers more information, and so on.

Assume for example that Webb manufactures and sells jackets. The jackets require tailoring and many hand operations. Webb sells exclusively to distributors, who in turn sell to independent clothing stores and retail chains. For simplicity, we assume that Webb’s only costs are manufacturing costs; it incurs no costs in other value-chain functions such as marketing and distribution. We assume that all units manufactured in April 2006 are sold in April 2006. Therefore, all direct materials are purchased and used in the same budget period, and there is no direct materials inventory at either the beginning or the end of the period. There are also no work-in-process or finished goods inventories at either the beginning or the end of the period. Webb has three variable-cost categories. The budgeted variable cost per jacket for each category is:

<b>Cost category</b>	<b>Variable-cost per jacket</b>
Direct material costs	\$60
Direct manufacturing labor costs	16
Variable manufacturing overhead costs	12
<b>Total variable costs</b>	<b>\$88</b>

**Actual April 2006 results are as follows:**

Units sold	10,000 Units
Revenues	\$1,250,000
<b>Variable costs:</b>	
Direct materials	\$621,600
Direct manufacturing labor	198,000
Variable manufacturing overhead	130,500
Fixed Costs	285,000

The number of units manufactured is the cost driver for direct materials, direct manufacturing labor, and variable manufacturing overhead. The relevant range for the cost driver is from 0 to 12,000 jackets. The budgeted fixed manufacturing costs are \$276,000 for production between 0 and 12,000 jackets.

The budgeted selling price is \$120 per jacket. This selling price is the same for all distributors. The static budget for April 2006 is based on selling 12,000 jackets. Actual sales for April 2006 were 10,000 jackets.

**Static Budget Variances**

- ▶ The static budget variance is the difference between the actual result and the corresponding budgeted amount in the static budget.
  - ❖ A **Favorable Variance (denoted by F)**— has the effect of increasing operating income relative to the budgeted amount.
    - ✓ For revenue items, F means actual revenue exceeds budgeted revenues.
    - ✓ For cost items, F means actual costs are less than budgeted costs.
  - ❖ An **Unfavorable Variance (denoted by U)** – has the effect of decreasing operating income relative to the budgeted amount. Unfavorable variances are also called adverse variances in some countries, for example, the United Kingdom.

	Favorable versus Unfavorable Variances		
	Profit	Revenue	Costs
Actual > Expected	F	F	U
Actual < Expected	U	U	F

*Static Budget Variances = Actual Results – Static Budget Amount*

Static budget based variances analysis for Webb Company for April 2006.

**Level 0 Analysis:**

Actual operating income	\$14,900
Budgeted operating income	<u>108,000</u>
Static budget variance for operating income	<b><u>\$93,100U</u></b>

**Note:Level 0 Analysis** gives the least detailed comparison of the actual and budgeted operating income. It compares the actual operating income with the budgeted operating income.

**Level 1 analysis:**

	Actual Results	Static-Budget Variances	Static-Budget
<b><u>(1) (2)=(1)-(3)(3)</u></b>			
Units sold	10,000	2,000U	12,000
Revenues	\$1,250,000	\$190,000U	\$1,440,000
<b>Variable costs:</b>			
Direct materials	621,600	98,400F	720,000
Direct manufacturing labor	198,000	6,000U	192,000
Variable Mfg. Overhead	<u>130,500</u>	<u>13,500F</u>	<u>144,000</u>
<b>Total Variable costs</b>	<u>\$950,100</u>	<u>\$105,900F</u>	<u>\$1,056,000</u>
Contribution margin	299,900	84,100U	384,000
Fixed costs	<u>285,000</u>	<u>9,000U</u>	<u>276,000</u>
Operating income	<b><u>\$14,900</u></b>	<b><u>\$93,100 U</u></b>	<b><u>\$108,000</u></b>

\$93,100U

Static-budget variance

**Level 1 Analysis:** Provides managers with more detailed information on the operating income. It also compares actual operating income items with line (each) operating income items.

### Steps in Developing Flexible Budget

The following steps are used to prepare a flexible budget:

- **Step1.** Identify the actual quantity of output.
- **Step2.** Calculate the flexible budget for revenues based on budgeted selling price and actual quantity of output.
- **Step3.** Calculate the flexible budget for costs based on budgeted variable cost per output unit, actual quantity of output, and budgeted fixed costs. The only difference between the static budget and the flexible budget is that the static budget is prepared for the planned output level, where as the flexible budget is based on the actual output level.

Webb develops its flexible budget in three steps:

- **Step1:** Identify the actual quantity of output.  
In April 2006, Webb produced and sold 10,000 jackets.
- **Step2:** Calculate the flexible budget for revenues based on budgeted selling price and actual quantity of output.  
Flexible-budget revenues = \$120 per jacket x 10,000 jackets = **\$1,200,000**
- **Step3:** Calculate the flexible budget for costs based on budgeted variable cost per output unit, actual quantity of output, and budgeted fixed costs.

#### Flexible budget variable costs:

Direct materials, (\$60 per jacket x 10,000 jackets)	\$600,000
Direct manufacturing labor (\$16 per jacket x 10,000 jackets)	160,000
Variable Mfg. overhead (\$12 per jacket x 10,000 jackets)	<u>120,000</u>
Total flexible budget variable costs	880,000
Plus: Flexible budget fixed costs	<u>276,000</u>
Flexible-budget total costs	<b><u>\$1,156,000</u></b>

#### Static-budget variance can be classified into two:

- i) Flexible-budget variance (or cost variance) (or total variance)
- ii) Sales-volume variance

**Flexible-Budget Variances:** The flexible budget variance is the difference between the actual results and the flexible- budget amount based on the level of output actually achieved in the budget period.

$$\text{Flexible Budget Variance} = \text{Actual Results} - \text{Flexible Budget Amounts}$$

$$\text{Or Flexible Budget Variance} = \text{Price Variance} + \text{Efficiency Variance}$$

The flexible –budget variance pertaining to revenues is often called a *selling- price variance* because it arises solely from differences between the actual selling price and the budgeted selling price.

$$\text{Selling price variance} = (\text{Actual selling price} - \text{Budgeted selling price}) \times \text{Actual units sold}$$

$$= (\$125 \text{ per jacket} - \$120 \text{ per jacket}) \times 10,000 \text{ jackets} = \textbf{\$50,000 F}$$

Webb has a favorable selling-price variance because the \$125 actual selling price exceeds the \$120 budgeted amount, which increases operating income. Marketing managers are generally in the best position to understand and explain the reason for this selling price difference. For example, was it because of better quality? Or was it because of an overall increase in market prices? Webb`s managers concluded it was because of a general increase in prices.

**Flexible-budget variance can be classified into two:**

1. Price (or rate) variance
2. Efficiency (or usage) variance

**Sales-Volume Variances:** The sales-volume variance is the difference between a flexible-budget amount and the corresponding static-budget amount. It's called the sales-volume variance because it represents the difference caused solely by the actual quantity of units sold and the quantity of units expected to be sold in the static budget.

$$\text{Sales-Volume Variance} = \text{Flexible-Budget Amount} - \text{Static-Budget Amount}$$

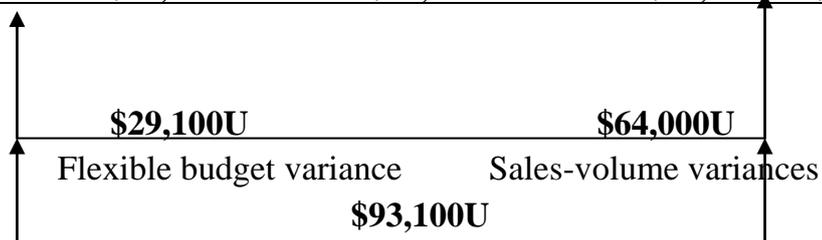
The sales-volume variances arises solely from the differences between the budgeted output level used to develop the static budget and the actual output level used to develop the flexible budget. Note particularly that any budgeted selling prices or unit variable costs are always held constant when sales-volume variances are computed. Hence:

$$\text{Sales-volume variance} = (\text{Budgeted selling price} - \text{Budgeted variable cost per unit}) \times (\text{Actual units sold} - \text{Static budget units sold})$$

$$\text{Sales-volume variance} = \text{Budgeted contribution margin per unit} \times (\text{Actual units sold} - \text{Static- budget units sold})$$

**Level 2 analysis:**

	<b>Actual Results</b> <b>(1)</b>	<b>Flexible-budget Variance</b> <b>(2)=(1)-(3)</b>	<b>Flexible Budget</b> <b>(3)</b>	<b>Sales-volume Variance</b> <b>(4)=(3)-(5)</b>	<b>Static Budget</b> <b>(5)</b>
Units sold	10,000	0	10,000	2,000U	12,000
Revenues	\$1,250,000	\$50,000F	\$1,200,000	\$240,000U	\$1,440,000
Variable costs:					
Direct materials	621,600	21,600U	600,000	120,000F	720,000
Direct mfg. labor	198,000	38,000U	160,000	32,000F	192,000
Variable mfg. OH	130,100	10,500U	120,000	24,000F	144,000
Total variable costs	<b>950,100</b>	<b>70,100U</b>	<b>880,000</b>	<b>176,000F</b>	<b>1,056,000</b>
Contribution margin	299,900	20,100U	320,000	64,000U	384,000
Fixed costs	285,000	9,000U	276,000	-	276,000
Operating income	<b>\$14,900</b>	<b>\$29,100U</b>	<b>\$44,000</b>	<b>\$64,000U</b>	<b>\$108,000</b>



## Static-budget variances

$$\text{Static-budget variance} = \text{Flexible-budget variance} + \text{Sales-volume variance}$$

The flexible-budget variance for total variable costs is unfavorable (\$70,100 U) for the actual output of 10,000 jackets. It's unfavorable because of one or both of the following:

- Webb used greater quantities of inputs (such as direct manufacturing labor-hours) relative to the budgeted quantities of inputs.
- Webb incurred higher price per unit for the inputs (such as the wage rate per direct manufacturing labor-hour) relative to the budgeted prices per unit of the inputs.

Higher input quantities relative to the budget and/or higher input prices relative to the budget could be the result of Webb deciding to produce a better product than what was planned in the budget or the result of inefficiencies in Webb's manufacturing and purchasing, or both. You should always think of variance analysis as providing suggestions for further investigation rather than as establishing conclusive evidence of good or bad performance.

The sales-volume variance in operating income for Webb measures change in budgeted contribution margin because Webb sold only 10,000 jackets rather than the budgeted 12,000.

$$\text{Sales-volume variance for operating income} = (\text{Budgeted contribution margin per unit}) \times (\text{Actual units sold} - \text{static-budget units sold})$$

$$= (\text{Budgeted selling price} - \text{Budgeted variable cost per unit}) \times (\text{Actual units sold} - \text{static-budget units sold})$$

$$\begin{aligned} &= (\$120 \text{ per jacket} - \$88 \text{ per jacket}) \times (10,000 \text{ jackets} - 12,000 \text{ jackets}) \\ &= \$32 \text{ per jacket} \times (-2,000 \text{ jackets}) \\ &= \underline{\underline{\$64,000 \text{ U}}} \end{aligned}$$

Webb's managers determine that the unfavorable sales-volume variance could be because of one or more of the following reasons:

1. The overall demand for jackets is not growing at the rate that was anticipated
2. Competitors are taking away market share from Webb
3. Webb did not adapt quickly to changes in customer preferences and tastes
4. Budgeted sales targets were set without careful analysis of market conditions
5. Quality problems developed that led to customer dissatisfaction with Webb's jacket

## Application of standard costing in variance analysis

Standard costing is a very important technique of cost control. Every organization wants to minimize the cost of production and maximize the profits. Standard costing is such a system which seeks to control the cost of each unit or batch or product through price determination beforehand of what should be the cost and then its comparison with actual cost.

## Definition of **Standard Costing**

1. According to J. Batty, “standard costing is a system of cost accounting which is designed to show in detail how much each product should cost to produce and sell when a business is operating at a stated level of efficiency and for a given volume of output.”
2. According to W.B. Lawrence, “A standard cost system is a method of cost accounting in which standard costs are used in recording certain transactions and the actual costs are compared with the standard costs to learn the amount and reason for any variations from the standard.”

## Application of Standard Costing

The application of standard costing requires the following conditions to be fulfilled:

1. A sufficient volume of standard products or components should be produced
2. Methods, procedures and materials should be capable of being standardized.
3. A sufficient number of costs should be capable of being controlled.

## Advantages of standard costing

The various advantages of standard costing are as follows:

- 1) **Simplification of cost bookkeeping:** it is very simple in comparison to historical costing. Once the standards are fixed for the product, the records can be simplified through uniformity which saves the time and money.
- 2) **Basis for measuring operating performance:** standards work as yardsticks for measuring the operating efficiency or inefficiency. For it, the comparisons are made between standard cost and actual cost.
- 3) **Cost reduction and control:** standard costing is very useful in cost reduction and control by eliminating or limiting lost time, idle time, spoilage, material wastage and lost machine hours.
- 4) **Management by exception:** standard costing is helpful in applying the principle of management by exception. Variance analysis brings the inefficient operations in light and management can focus its attention towards those matters only.
- 5) **Formulation of production and price policies:** Standard costs represent long-term estimates, cost and prices. It helps the management in the formulation of ideal production policy.
- 6) **Implementing incentive schemes:** standard costing promotes the implementation of incentive schemes in the organization because every incentive scheme is based on certain standards which are determined under this system.
- 7) **Facilitates comparison:** Cost comparison between different products and department can be done under standard costing. It also makes possible the comparison of costs of one period with another.
- 8) **Promotes cost consciousness and efficiency:** It also promotes cost consciousness as the employees know that their performance shall be in assessing manufacturing inefficiencies and fixing responsibilities. This improves the efficiency of the organization.

## Limitations of standard costing

1. **Not appropriate for small concerns:** it is not appropriate for small concerns as the installation of standard costing requires high degree of skill and the small concerns may not have expert staff for handling or operating the system
2. **Not suitable for certain industries:** this system is not suitable for industries which produce non-standardized products and for job works which change according to customers` requirements

Why standard costs are often used in variance analysis? Because, standard costs exclude past inefficiencies and take into account future changes.

A standard is a carefully predetermined price, cost or quantity amount. It is usually expressed on a per unit basis. The advantages of using standard amounts for variance analysis are:

- ✓ *They can exclude past inefficiencies*
- ✓ *They can take into account changes expected to occur in the budgeted period*

Webb has developed standard inputs and standard costs for each of its variable cost items. A standard input is a carefully predetermined quantity of inputs (such as pounds of materials or manufacturing labor-hours) required for one unit of output. A standard price is a carefully determined price that a company expects to pay for a unit of input. A standard cost is a carefully predetermined cost. Standard costs can relate to units of inputs or units of outputs.

The standard direct materials input allowed for one output is 2.00 square yards of cloth (jacket), at \$30 standard cost per square yard and standard manufacturing labor time allowed is 0.80 hours per output unit, at \$20 standard cost per hour.

Webb's budgeted cost for each variable direct-cost item is computed as follows:

Standard cost per output unit for each variable direct-cost input = Standard input allowed for one output unit x Standard price per input unit

### Direct Materials:

2.00 square yards of cloth input allowed per output unit (jacket) manufactured, at \$30 standard cost per square yard.

$$\text{Standard cost} = 2.00 \times \$30 = \$60.00 \text{ per output unit manufactured}$$

### Direct manufacturing labor:

0.80 manufacturing labor hour of input allowed per output unit manufactured, at \$20 standard cost per hour.

$$\text{Standard cost} = 0.80 \times \$20 = \$16.00 \text{ per output unit manufactured}$$

## Price Variances and Efficiency Variances for Direct Cost Inputs

Consider Webb's two direct cost categories. The actual cost for each of these categories in April 2006 is:

Direct materials purchased and used

- 1) Square yards of cloth input purchased and used 22,200
- 2) Actual price paid per square yard \$28
- 3) Cost of direct materials (1x2) \$621,600

Direct manufacturing labor:

- 1) Manufacturing labor-hour 9,000
- 2) Actual price paid per direct manufacturing labor hour \$22
- 3) Direct manufacturing labor costs (1x 2) \$198,000

We assume here that the quantity of direct materials used is equal to the quantity of direct materials purchased.

### Price Variance

A price variance is the difference between the actual price and the budgeted price multiplied by the actual quantity of input in question (such as direct materials purchased or used). A price variance is sometimes called input-price variance or rate variance, especially when referring to a price variance for direct labor.

#### ► The formula for computing the price variance is:

$$\text{Price Variance} = (\text{Actual Price of Input} - \text{Budgeted Price of Input}) \times \text{Actual Quantity of Input}$$

Price variances for each of Webb's two direct-cost categories are:

$$\text{Direct materials } (\$28 - \$30) \times 22,200 = \$44,400\text{F}$$

$$\text{Direct manufacturing labor } (\$22 - \$20) \times 9,000 = \underline{18,000\text{U}}$$
$$\underline{\underline{\$26,400\text{F}}}$$

The direct materials price variance is favorable because actual price of cloth is less than the budgeted price, resulting in an increase in operating income. The direct manufacturing labor price variance is unfavorable because actual wage rate paid to labor is more than the budgeted rate, resulting in a decrease in operating income.

Always consider a broad range of possible causes for a price variance. For example, Webb's favorable direct materials price variance could be because of one or more of the following:

- Webb's purchasing officer/manager negotiated the direct materials prices more skillfully than was planned for in the budget
- The purchasing manager changed to a lower-price supplier
- The purchasing manager bought in larger lot sizes than budgeted, thus obtaining quantity discounts (i.e., Webb's purchasing manager ordered larger quantities than the quantities budgeted, thereby obtaining quantity discounts).
- Materials prices decreased unexpectedly due to, say, industry oversupply

- Budgeted purchase prices were set without careful analysis of the market, and
- Purchasing manager received unfavorable terms on nonpurchase price factors (such as lower quality materials)

### Efficiency Variance

- An efficiency variance is the difference between the actual quantity of input used (such as yards of cloth of the direct materials) and the budgeted quantity of input that should have been used, multiplied by the budgeted price.
- Efficiency variances are sometimes called usage variance. Computation of an efficiency variance requires measurement of inputs for a given level of output. For any level of output, the efficiency variance is the difference between the input that was actually used and the input that should have been used to achieve that actual output, holding input price constant at the budgeted price.

$$\text{Efficiency Variance} = (\text{Actual quantity of input used} - \text{Budgeted quantity of input allowed for actual output}) \times \text{Budgeted Price of Input}$$

The idea here is that an organization is inefficient if it uses more inputs than budgeted for the actual output units achieved, and it is efficient if it uses fewer inputs than budgeted for the actual output units achieved.

### The efficiency variances for each of the Webb's direct cost categories are:

$$\begin{aligned} \text{Direct Material} &= [22,200 \text{ yards} - (10,000 \text{ units} \times 2 \text{ yards})] \times \$30 \\ &= (22,200 \text{ yards} - 20,000 \text{ yards}) \times \$30 \dots\dots\dots \$66,000\text{U} \\ \text{Direct Mfg. labor} &= [9,000 \text{ hours} - (10,000 \text{ units} \times 0.80 \text{ hour})] \times \$20 \\ &= (9,000 \text{ hours} - 8,000 \text{ hours}) \times \$20 \dots\dots\dots \underline{20,000 \text{ U}} \\ &\underline{\$86,000\text{U}} \end{aligned}$$

The two manufacturing efficiency variances are direct materials efficiency variance and direct manufacturing labor efficiency variance are each unfavorable because more input was used than was budgeted, resulting in a decrease in operating income.

As with price variances, there is a broad range of possible causes for these efficiency variances. For example, Webb's unfavorable efficiency variance for direct manufacturing labor could be because of one or more of the following:

- Webb's personnel manager hired under-skilled workers
- Webb's production scheduler inefficiently scheduled work, resulting in more manufacturing labor time than budgeted being used per jacket
- Webb's maintenance department did not properly maintain machines, resulting in more manufacturing labor time than budgeted being used per jacket.
- Budgeted time standards were set too tight without careful analysis of the operating conditions and the employee's skills.

Note that managers generally have more control over efficiency variances than price variances. That`s because the quantity of inputs used is primarily affected by factors inside the company, but price changes are primarily due to market forces outside the company.

### **Learning activity**

Student will look in to variance analysis of the firm that they visited under the previous section and contrast it with their theoretical understanding and present it in the class.

### **Continues Assessment.**

Quiz/test, and presentation/ report

### **Summary**

Variance represents the difference between an amount based on an actual result and the corresponding budgeted amount. Master budget (static budget) is based on the level of output planned at the start of the budget period while flexible budget calculates budgeted revenues and budgeted costs based on the actual output level in the budget period. The difference between the actual result and the corresponding budgeted amount in the static budget is called static budget variance. Static-budget variance can be classified into two: Flexible-budget variance and Sales-volume variance. Flexible budget variance is the difference between the actual results and the flexible- budget amount based on the level of output actually achieved in the budget period while sales-volume variance is the difference between a flexible-budget amount and the corresponding static-budget amount.

# CHAPTER VII

## RELEVANT INFORMATION FOR DECISIONS IN VALUE CHAIN DEVELOPMENT

### Pre-test

Outline the five-step sequence in a decision process

.....

All future costs are relevant.” Do you agree? Why?

.....

Distinguish between quantitative and qualitative factors in decision making

.....

Describe two potential problems that should be avoided in relevant-cost analysis

.....

### Section content

- Decision Making and Relevant Information
- The Concept of Relevance
- Qualitative and Quantitative Relevant Information
- One-Time-Only Special Order
- Addition and Deletion of Products, Services, or Departments
- Insourcing versus Outsourcing and Make-versus-Buy Decisions
- Opportunity-Costs, Outsourcing and Capacity Constraints
- Product-Mix Decisions with Capacity Constraints
- How relevant information assist in value chain development

### Decision Making and Relevant Information

How many decisions have you made today? Maybe you made a big one, such as accepting a job offer. Or maybe your decision was as simple as settling on your plans for the weekend or choosing a restaurant for dinner. Regardless of whether decisions are significant or routine, most people follow a simple, logical process when making them. This process involves gathering information, making predictions, making a choice, acting on the choice, and evaluating results. It also includes deciding what costs and benefits each choice affords. Some costs are irrelevant. For example, once a coffee maker is purchased, its cost is irrelevant when deciding how much money a person saves each time he or she brews coffee at home versus buying it at Starbucks. The cost of the coffee maker was incurred in the past, and the money is spent and can't be recouped. This chapter will explain which costs and benefits are relevant and which are not—and how you should think of them when choosing among alternatives.

### Information and the Decision Process

Managers usually follow a decision model for choosing among different courses of action. A decision model is a formal method of making a choice that often involves both quantitative and qualitative analyses. Management accountants analyze and present relevant data to guide managers' decisions.

The five step-decision process to make decisions:

- Step 1: Obtain information (both historical costs and other information)
- Step 2: Make predictions about future costs (specific predictions)
- Step 3: Choose an alternative
- Step 4: Implement the decision
- Step 5: Evaluate performance

## **The Concept of Relevance**

Relevant costs are expected future costs and relevant revenues are expected future revenues that differ among the alternative courses of actions being considered. Be sure you understand that to be relevant costs and relevant revenues they must

- **Occur in the future**—every decision deals with selecting a course of action based on its expected future results—and
- **Differ among the alternative courses of action**—costs and revenues that do not differ will not matter and, hence, will have no bearing on the decision being made. The question is always, what difference will an action make?

## **Qualitative and Quantitative Relevant Information**

Managers divide the outcomes of decisions into two broad categories: quantitative and qualitative. Quantitative factors are outcomes that are measured in numerical terms. Some quantitative factors are financial; they can be expressed in monetary terms. Examples include the cost of direct materials, direct manufacturing labor, and marketing. Other quantitative factors are nonfinancial; they can be measured numerically, but they are not expressed in monetary terms. Reduction in new product-development time for a manufacturing company and the percentage of on-time flight arrivals for an airline company are examples of quantitative nonfinancial factors. Qualitative factors are outcomes that are difficult to measure accurately in numerical terms. Employee morale is an example.

Relevant-cost analysis generally emphasizes quantitative factors that can be expressed in financial terms. But just because qualitative factors and quantitative nonfinancial factors cannot be measured easily in financial terms does not make them unimportant. In fact, managers must wisely weigh these factors.

## **Key Features of Relevant Information**

- Past (historical) costs may be helpful as a basis for making predictions. However, past costs themselves are always irrelevant when making decisions.
- Different alternatives can be compared by examining differences in expected total future revenues and expected total future costs.
- Not all expected future revenues and expected future costs are relevant. Expected future revenues and expected future costs that do not differ among alternatives are irrelevant and, hence, can be eliminated from the analysis. The key question is always, “What difference will an action make?”
- Appropriate weight must be given to qualitative factors and quantitative nonfinancial factors.

The concept of relevance applies to all decision situations. We start by considering decisions that affect output levels such as whether to introduce a new product or to try to sell more units of an existing product.

## **One-Time-Only Special Order**

One type of decision that affects output level is accepting or rejecting special order when there is idle production capacity and the special order have no long-run implications. We use the term one-time-special order to describe these conditions.

Profit is made if the incremental revenue exceeds the incremental costs. If excess capacity exists, then relevant cost generally equals variable cost to make special order.

## **Potential Problems in Relevant-Cost Analysis**

Managers should avoid two potential problems in relevant-cost analysis. First, they must watch for incorrect general assumptions, such as all variable costs are relevant and all fixed costs are irrelevant.

Second, unit-cost data can potentially mislead decision makers in two ways:

1. When irrelevant costs are included
2. When the same unit costs are used at different output levels. Generally, managers use total costs rather than unit costs because total costs are easier to work with and reduce the chance for erroneous conclusions. Then, if desired, the total costs can be unitized.

The best way for managers to avoid these two potential problems is to keep focusing on (1) total revenues and total costs (rather than unit revenue and unit cost) and (2) the relevance concept. Managers should always require all items included in an analysis to be expected total future revenues and expected total future costs that differ among the alternatives.

### Addition and Deletion of Products, Services, or Departments

Relevant information also plays an important role in decisions about adding or deleting products, services, or departments.

The following costs play an important role in decision about adding or deleting product or services.

- ❖ **Avoidable costs:** costs that will not continue if an ongoing operation is changed or deleted are relevant.
- ❖ **Unavoidable costs:** costs that continue even if an operation is halted—are not relevant. Unavoidable costs include many common costs, which are those costs of facilities and services that are shared by users. For example, store depreciation, heating, air conditioning, and general management expenses are costs of resources used by all departments.

The purpose in deciding whether to add or drop new products, services, or departments is to obtain the greatest contribution possible to pay unavoidable costs. The unavoidable costs will remain the same regardless of any decision, so the key is picking the alternative that will contribute the most toward paying off these costs.

Consider a discount department store that has three departments: groceries, general merchandise, and drugs. Management is considering dropping the grocery department, which has consistently shown operating loss. The following table reports the store's present annual operating income (in thousands of dollars).

	Departments			
	Groceries	General Merchandise	Drugs	Total
Sales	\$1,000	\$800	\$100	\$1,900
Variable cost of goods sold and expenses*	800	560	60	1,420
Contribution margin	\$200 (20%)	\$240 (30%)	\$40 (40%)	480 (25%)
Fixed expenses (salaries, depreciation, insurance, property taxes, and so on):				
Avoidable	\$150	\$100	\$15	\$265
Unavoidable	60	100	20	180
Total fixed expenses	\$210	\$200	\$35	\$445
Operating income	(\$10)	\$40	\$5	\$35

\*Examples of variable expenses included paper shipping bags and sales commissions.

Required:

1. Assume first that the only alternatives to be considered are dropping or continuing the grocery department, which shows a loss of \$10,000. Assume further that the total assets invested would be unaffected by the decision. The vacated space would be idle, and the unavoidable costs would continue. Which alternative would you recommend?

2. Assume now that the space made available by the dropping of groceries could be used to expand the general merchandise department. The space would be occupied by merchandise that would increase sales by \$500,000, generate a 30% contribution margin percentage, and have avoidable fixed costs of \$70,000. Which alternative would you recommend? The answers are discussed below:
1. Assume first that the only alternatives to be considered are dropping or continuing the grocery department, which shows a loss of \$10,000. Assume further that the total assets invested would be unaffected by the decision. The vacated space would be idle, and the unavoidable costs would continue. Which alternative would you recommend?

Income statement	Store as a whole		
	Total Before Change (a)	Effect of Dropping Groceries (b)	Total after Change (a)-(b)
Sales	\$1,900	\$1,000	\$900
Variable expenses	1,420	800	620
Contribution margin	\$480	\$200	\$280
Avoidable fixed expenses	265	150	115
Profit contribution to common space and other unavoidable costs	\$215	\$50	\$165
Common space and other unavoidable costs	180	-	180
Operating income	\$35	\$50	\$(15)

*Decision: Matters would be worse, rather than better, if groceries were dropped and the vacated facilities (space) left idle.*

2. Assume now that the space made available by the dropping of groceries could be used to expand the general merchandise department. The space would be occupied by merchandise that would increase sales by \$500,000, generate a 30% contribution margin percentage, and have avoidable fixed costs of \$70,000. Which alternative would you recommend?

	Effects of Changes			
	Total Before Change (a)	Drop Groceries (b)	Expand General Merchandise (c)	Total After Changes=(a) – (b) + (c)
Sales	\$1,900	\$1,000	\$500	\$1,400
Variable expenses	1,420	800	350	970
Contribution margin	\$480	\$200	\$150	\$430
Avoidable fixed expenses	265	150	70	185
Contribution to common space and other unavoidable costs	\$215	\$50	\$80	\$245
Common space and other unavoidable costs*	180	-	-	180
Operating income	\$35	\$50	\$80	\$65

\*Includes the \$60,000 of former grocery fixed costs, which were allocations of unavoidable common costs that will continue regardless of how the space is occupied.

The \$80,000 increase in operating income of general merchandise more than offsets the \$50,000 decline from eliminating groceries, providing an overall increase in operating income of \$30,000 (\$65,000 - \$35,000).

### **Insourcing versus Outsourcing and Make-versus-Buy Decisions**

We now apply the concept of relevance to another strategic decision: whether a company should make a component part or buy it from a supplier. We again assume idle capacity.

#### **Outsourcing and Idle Facilities**

Outsourcing is purchasing goods and services from outside vendors rather than producing the same goods or providing the same services within the organization, which is insourcing. For example, Kodak prefers to manufacture its own film (insourcing) but has IBM do its data processing (outsourcing). Honda relies on outside vendors to supply some component parts but chooses to manufacture other parts internally.

Decisions about whether a producer of goods or services will insource or outsource are also called make-or-buy decisions. Surveys of companies indicate that managers consider quality, dependability of suppliers, and costs as the most important factors in the make-or-buy decision. Sometimes, however, qualitative factors dominate/dictate management's make-or-buy decision. For example, Dell Computer buys the Pentium chip for its personal computers from Intel because Dell does not have the know-how and technology to make the chip itself. In contrast, to maintain the secrecy of its formula, Coca-Cola does not outsource the manufacture of its concentrate. Boeing must decide whether to buy or make many of the tools used in assembling 777 airplanes. IBM must decide whether to develop its own operating system for a new computer or to buy it from a software vendor.

#### **Opportunity-Costs, Outsourcing and Capacity Constraints**

Deciding to use a resource in a particular way causes a manager to forgo the opportunity to use the resource in alternative ways. This lost opportunity is a cost that the manager must consider when making a decision. Opportunity cost is the contribution to operating income that is forgone by not using a limited resource in its next-best alternative use. For example, the (relevant) cost of going to school for an MBA degree is not only the cost of tuition, books, lodging, and food, but also the income sacrificed (opportunity cost) by not working. Presumably, the estimated future benefits of obtaining an MBA (for example, a higher-paying career) will exceed these costs.

#### **Product-Mix Decisions with Capacity Constraints**

We now examine how the concept of relevance applies to product-mix decisions—the decisions made by a company about which products to sell and in what quantities. These decisions usually have only a short-run focus, because they typically arise in the context of capacity constraints that can be relaxed in the long run. In the short run, for example, BMW, the German car manufacturer, continually adapts the mix of its different models of cars (for example, 325i, 525i, and 740i) to fluctuations in selling prices and demand.

To determine product mix, a company maximizes operating income, subject to constraints such as capacity and demand. Throughout this section, we assume that as short run changes in product mix occur, the only costs that change are costs that are variable with respect to the number of units produced (and sold). Under this assumption, the analysis of individual product contribution margins provides insight into the product mix that maximizes operating income. Assume for example, Power Recreation assembles two engines, a snowmobile engine and a boat engine, at its Lexington, Kentucky, plant.

	Snowmobile Engine	Boat Engine
Selling price	\$800	\$1,000
Variable cost per unit	560	625
Contribution margin per unit	\$240	\$375
Contribution margin percentage ( $\$240 \div \$800$ ; $\$375 \div \$1,000$ )	30%	37.5%

Assume that only 600 machine-hours are available daily for assembling engines. Additional capacity cannot be obtained in the short run. Power Recreation can sell as many engines as it produces. The constraining resource, then, is machine-hours. It takes two machine-hours to produce one snowmobile engine and five machine-hours to produce one boat engine. What product mix should Power Recreation's managers choose to maximize its operating income?

In terms of contribution margin per unit and contribution margin percentage, boat engines are more profitable than snowmobile engines. The product that Power Recreation should produce and sell, however, is not necessarily the product with the higher individual contribution margin per unit or contribution margin percentage. Managers should choose the product with the highest contribution margin per unit of the constraining resource(factor). That's the resource that restricts or limits the production or sale of products.

	Snowmobile Engine	Boat Engine
Contribution margin per unit	\$240	\$375
Machine-hours required to produce one unit	2 machine-hours	5 machine-hours
Contribution margin per machine-hour $\$240 \text{ per unit} \div 2 \text{ machine-hours/unit}$ ; $\$375 \text{ per unit} \div 5 \text{ machine-hours/unit}$	\$120/machine-hour	\$75/machine-hour
Total contribution margin for 600 machine-hours $\$120/\text{machine-hour} * 600 \text{ machine-hours}$ ; $\$75/\text{machine-hour} * 600 \text{ machine-hours}$	\$72,000	\$45,000

The number of machine-hours is the constraining resource in this example and snowmobile engines earn more contribution margin per machine-hour (\$120/machine-hour) compared to boat engines (\$75/machine-hour). Therefore, choosing to produce and sell snowmobile engines maximizes total contribution margin (\$72,000 versus \$45,000 from producing and selling boat engines) and operating income. Other constraints in manufacturing settings can be the availability of direct materials, components, or skilled labor, as well as financial and sales factors. In a retail department store, the constraining resource may be linear feet of display space. Regardless of the specific constraining resource, managers should always focus on maximizing total contribution margin by choosing products that give the highest contribution margin per unit of the constraining resource.

In many cases, a manufacturer or retailer has the challenge of trying to maximize total operating income for a variety of products, each with more than one constraining resource. Some constraints may require a manufacturer or retailer to stock minimum quantities of products even if these products are not very profitable. For example, supermarkets must stock less-profitable products because customers will be willing to shop at a supermarket only if it carries a wide range of products that customer's desire. To determine the most profitable production schedule and the most profitable product mix, the manufacturer or retailer needs to determine the maximum total contribution margin in the face of many constraints.

Finally, there is the question of managing the bottleneck constraint to increase output and, therefore, contribution margin. Can the available machine-hours for assembling engines be increased beyond 600, for example, by reducing idle time? Can the time needed to assemble each snowmobile engine (two machine-hours) and each boat engine (five machine-hours) be reduced, for example, by reducing setup time and processing time of assembly? Can quality be improved so that constrained capacity is used to produce only good units rather than some good and some defective units? Can some of the assembly operations be outsourced to allow more engines to be built? Implementing any of these options will likely require Power Recreation to incur incremental costs. Power Recreation will implement only those options where the increase in contribution margins exceeds the increase in costs.

### **How relevant cost information assist in value chain development**

Value chain refers to the sequence of business functions in which customer usefulness is added to products or services. Cost accounting will contribute to value chain by providing cost information regarding each business function involved in the value chain. It also aids in decision like:

- Which is cheaper? To buy or rent equipments used to produce products
- In sourcing or out sourcing
- Further processing or selling for joint products

Management accountants track the costs incurred in each value-chain category. Their goal is to reduce costs in each category and to improve efficiency which will positively contribute profitability.

One of the key challenges for development is to reduce rural poverty in developing countries through increasing production and export of agricultural products. However, changes in the nature of markets and trade for these products in recent years have created new challenges.

The new challenges arise in the areas of markets and competition and also from the increasing importance of public and private standards in regulating trade:

1. The increasing importance of large buyers in global food value chains. The requirements of large buyers (not only retailers but also processors) for quality, reliability of delivery and product differentiation have raised the level of competence required of producers and the level of coordination in value chains. In the case of many non-traditional agricultural exports, issues of product quality and freshness (and hence time to market), product differentiation and increased processing place great demands on production systems and may favor large-scale production.
2. Increasing concentration at various points in the value chain, including input suppliers (seeds, feedstock's, chemicals, input packages for GM products, etc.), processors and retailers. This concentration has implications for the questions of access to agribusiness value chains for small producers, and also the returns producers obtain from participating in these chains. It raises questions about market structures and market power, as well as strategies to offset this power: regional branding, geographical indicators, niche products and alternative marketing channels.
3. The increasing importance of both public and private standards in food industry. Public, mandatory standards relating primarily to human and animal safety (sanitary and phytosanitary standards, SPS) have become more extensive and stringent. At the same time, private sector standards, and in particular standards developed by coalitions of private companies and business associations have become increasingly important factors in access to marketing channels. Such standards relate to food safety, social standards and environmental impact.

Trends in global agribusiness are complex and multi-faceted. The increasing prominence of large retailers in the global economy has created a number of impacts. For example, the increasing importance of supermarkets in the retailing of fresh and processed food has led to a substantial re-organization of agribusiness supply systems. One significant impact has been on relationships between retailers and processors/manufacturers of food products:

"With the substantial consolidation of retail and procurement markets at both the national and aggregate EU level, the nature of the supply chain has changed considerably. Where manufacturers may traditionally have driven distribution by developing brands and then used a network of wholesalers and retailers to sell and distribute goods to consumer, it is now retailers who mostly drive the supply chain....The upshot of this revolution has been that producer market power has largely given way to retailer buyer power, where retailers hold the whip hand over producers" (Dobson *et al.* 2003). This change has had a substantial impact on food processors and manufacturers. Even the largest branded manufacturers have had to come to terms with giant retailers. For example,

**Learning activity**

A branch office or business segment that shows negative operating income should be shut down. Do you agree? Explain briefly

**Summary**

A decision model is a formal method of making a choice that often involves both quantitative and qualitative analyses. The five step-decision process to make decisions involves: gathering information; making predictions; making a choice; acting on the choice, and evaluating results. Relevant costs are expected future costs and relevant revenues are expected future revenues that differ among the alternative courses of actions being considered. To be relevant costs and relevant revenues they must occur in the future and differ among the alternative courses of action. The concept of relevance applies to all decision situations such as: one-time-only special order; addition and deletion of products, services, or departments; insourcing-versus-outsourcing and make-versus-buy Decisions; and product-mix Decisions with capacity constraints.

**3.4.4. Proof of ability**

The student will be evaluated through final examination which covers the entire learning unit and case based interview. This is assessed out of 40% to 50%.

The student has:	Criteria and methods of assessment
Compared cost accounting, management accounting and financial accounting.	Discussion on differences and similarities between cost, management and financial accounting (written exam).
Classified costs	Explanation of costs by different parameters (written exam)
Computed Product cost	Articulation of techniques needed to compute product cost (written exam)
Applied cost -volume -profit analysis techniques	illustration of cost-volume-profit analysis techniques and skills (written exam)
Evaluated master budget	Demonstrated master budget procedures (written exam and interview )
Evaluated flexible budget and variance	Analyses of variances ( written exam)
<b>Final result</b>	

**Major Reference**

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