Cost and Management Accounting - II

ACFN 2122

Module

DEPARTMENT OF ACCOUNTING AND FINANCE

COLLEGE OF BUSINESS AND ECONOMICS

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JANUAEY 2020

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PREFACE

Accounting shapes our lives. It changes organizations and alters our social, economic and physical environment. Whether or not we engage in producing and/or reading accounting information, it influences what we can do and cannot do. Corporate decisions regarding new product developments, pricing strategy, staff recruitment and salary levels are generally influenced by accounting information. The way in which a manager acts is often associated with how he or she reacts to accounting data. This module is about understanding the preparation and use of cost and management accounting information. Management accounting is concerned with the measurement and reporting of financial and other types of information to managers in their pursuit of organizational and other goals where as cost accounting is more concerned with information on the acquisition and consumption of resources. Cost accounting tends to provide a useful input in to management accounting.

Dear learners! The focus of this module, cost and management accounting I, is cost accounting aspect of the course. The module for Cost and management accounting II which will be prepared in the near future will emphasize management accounting aspect of the course. Studying cost accounting is one of the best business investments a student can make. Why? Because success in any organizations from the smallest cornerstone to the largest multinational companies requires the use of accounting concepts and practices. Cost accounting provides key data to managers for planning and controlling, as well as costing products, services and customers.

The central focus of this module is how cost accounting helps managers make better decisions. It is organized in to six chapters. Topics included are : Cost Volume profit analysis, Relevant cost and special decisions, master budget and responsibility accounting, flexible budget , variances and management control, measuring yield ,mix and quantity effects and control systems and transfer pricing. Learning objectives, detailed and self explanatory discussions, quick check questions, summary, review questions and answer keys for review questions are incorporated for each chapter. Most importantly, constructive comments, corrections and suggestions of readers are highly valuable to prepare the revised edition of this material. Readers/learners of this material can send their constructive comments and suggestions through (mkybil@gmail.com)

Acknowledgement

First and foremost, I would like to express my deepest thanks and gratitude to writers of related books and reference materials from which this module is compiled. A special word of mouth is their credit. I also appreciate editor, Ato Lisanework A. and my colleagues, especially Dr.M.S. Vasu, for their valuable constructive comments, suggestions and assistance. Last but not least, I highly thank W/t Etagegn Gualu for typing of this material.

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Chapter: 1 COST VOLUME PROFIT ANALYSIS

1.1 Learning Objectives

After studying this chapter, you should be able to:

- Identify the basic cost volume profit (CVP) assumptions
- Explain Essential features of CVP analysis
- Determine breakeven point and output to achieve target operating income using the equation , contribution margin and graph methods
- Incorporate income tax considerations in to CVP analysis
- Explain the use of CVP analysis in decision making and how sensitivity analysis can help managers cope with certainty
- Use CVP analysis to plan costs
- Apply CVP analysis to a multi product company
- Adapt CVP analysis to multiple cost driver situations
- Distinguish between contribution margin and gross margin

1.1

1.2 Introduction

Hello Dear learners! In this chapter you will learn about Cost Volume profit Analysis (CVP). Profit is the most important measure of a firm's performance. In the free market economy, profit is a guide for allocating resources efficiently. An analysis of the effects of various factors on profits is an essential step in financial planning and decision-making. The analytical technique used to study the be haviour of profit in response to the changes in volume, costs, and prices called the Cost-volume-profit (CVP) analysis. It is a device used to determine the usefulness of the profit planning process of the firm. As a starting point in profit planning, CVP analysis helps to determine the minimum sales volume to avoid losses and the sales volume at which the profit goal of the firm will be achieved. As an ultimate objective, it helps managements in seeking the most profitable combination of the costs and volume. A dynamic management, therefore, uses CVP analysis to predict and evaluate the implications of its short-term decisions about fixed costs, variable costs, volume, and selling price for its profit plans on a continuous basis. Generally, CVP analysis provides answers questions such as:

- What minimum level of sales need be achieved to avoid sales?
- What should the sales level to learn a target profit?
- What will be the effect of changes in prices, costs, and volume on profits?
- How will profits be affected when sales mix is changed?
- What will be the new breakeven point under changes in prices, costs, volume or sales mix?
- What will be the impact of plant expansion on cost-volume-profit relationships?
- Which product is the most profitable and which one is the least profitable?
- Should sale of a product or operation of a plant be discontinued?
- Should the firm be shut down temporarily?

The CVP analysis is of immense utility to management as it provides an insight into the effects and inter-relationships of factors, which influence profits of the firm. It is with the help of the CVP analysis that the finance executive is enabled to present data in accurate reports and easily understood charts to management for action.

Cost-volume-profit analysis involves a study of the relationship between the following factors: *prices of products, volume, or level of activity, per unit variable costs, total fixed costs, mix of products sold, and operating income.* Managers commonly use CVP as a tool to help them answer such questions as; how will revenues and cost affected if we sell 500 more units, if we raise or lower our selling price, if we expand business into overseas markets. These questions have a common "what if" theme.

Quick Check exercise

Define cost-volume-profit analysis.

1.3 Importance and Basics of CVP Analysis

Cost-volume-profit analysis provides a sweeping (far-reaching or extensive) financial overview of the planning process. CVP analysis is a *key factor in many decisions*, including choice of product lines, pricing of products, marketing strategy, and utilization of productive activities. The concept is so pervasive (all encompassing) in cost and managerial accounting that it touches on virtually everything that a manager does. Because of its wide range of usefulness, CVP analysis is undoubtedly the best tool the manger has *for discovering the untapped* (unexploited

or available) *profit potential* that may exist in an organization. This chapter examines CVP analysis and explains how the reasonableness underlying its assumptions affects the reliability of its results. CVP analysis helps managerial decision making in the following areas:

- Profit planning (target Net Income)-to forecast profit accurately
- Pricing- to formulate pricing policies by projecting the effect that various price structures have on costs and profits, specifically when the demand for the product is elastic.
- To set up flexible budgets and to evaluate performance
- To ascertain the amount of overhead costs that could be charged to product costs at different levels of operation
- To make short-term tactical decisions, for example, shift working, acceptance of special orders, choices of sales mixes decision.
- Facility allocation, outsourcing decision and drop/continue with existing product

1.4 Classifying Costs into Variable and Fixed

One of the basic concepts in discussion about cost is cost behavior, sometimes called variability. Cost behavior is the manner in which costs change as the volume (units of output, direct labor hours, or some other factor) changes or it means how a cost will react or respond to changes in the level of business activity. An understanding of cost behavior is essential to anyone who wishes to use cost information as a tool for planning, controlling, and evaluating operations. As the activity level rises and falls, a particular cost may rise and fall as well or it may remain constant. For planning purposes, a manager must be able to anticipate which of these will happen and, if a cost is expected to change, the manager must know by how much it will change. Knowing how costs behave in relation to a given level of business activity enables management to maximize profitability through more effective planning and control. In general, based on cost behavior costs can be classified as both fixed, variable, and semi-variable. A fourth category-stair-step, or semi-fixed, costs is also used by some analysts.

I. VARIABLE COSTS

A variable cost is a cost that varies in total in direct proportion to changes in the level of activity (or cost driver). As, for instance, activity increases and decreases by 15%, total variable cost also

the cost of direct materials used during a period will vary in total in direct proportion to the number of units that are produced. For the moment, notice the following two essential points:

Total variable cost rises and falls as the activity level (or cost driver) rises and falls.

Variable cost per unit is constant or uniform irrespective of changes in the cost driver.

To sum up, as activity changes, total variable cost changes proportionately while variable cost per unit remains the same. The table below summarizes the whole idea:

When activity	Increases	Decreases
1) Total variable cost	Increases proportionately	Decreases proportionately
2) Variable cost per unit	Remains constant	Remains constant

There are many examples of costs that are variable with respect to the units of products and services provided by a company. In a manufacturing company, variable costs include items such as direct materials, some elements of manufacturing overhead such as lubricants, and such marketing costs as shipping and sales commissions. In a merchandising company, variable costs include items such as cost of goods sold, commissions to sales persons, and billing costs. In a hospital, the variable costs of providing health care services to patients would include the costs of the supplies, drugs, meals, and perhaps nursing services. In general, when we say that a cost is variable, we ordinarily mean it is variable with respect to the volume of revenue-generating output or simply the cost driver.

II. FIXED COSTS

A fixed cost is a cost that remains constant in total regardless of changes in the level of activity. In other words, fixed costs remain unchanged in total as the level of activity (cost driver) varies. Unlike variable costs, fixed costs are not affected by changes in activity. Consequently, as the activity level rises and falls by a certain percent, the total fixed costs remain constant unless influenced by some outside forces, such as price changes. Note the following two essential points:

Total fixed cost remains constant irrespective of raises and falls in the cost driver.

Fixed cost per unit changes inversely with changes in the cost driver. That is, fixed cost per unit rises and falls as the cost driver falls and rises.

To summarize, as the activity level changes, total fixed cost remains unchanged but unit fixed cost changes inversely. The table below summarizes the whole idea:

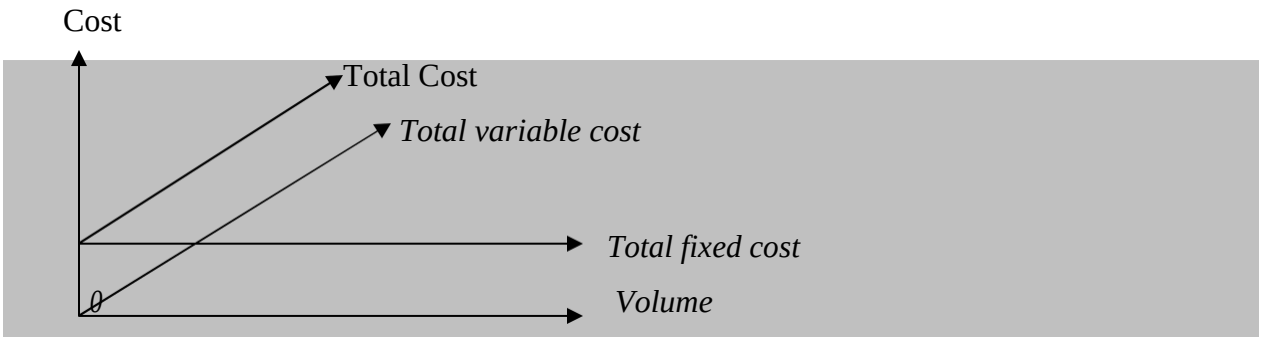
When activity	Increases	Decreases
1) Total fixed cost	Remains constant	Remains constant
2) Fixed cost per unit	Decreases	Increases

Before we study CVP analysis, we must be familiar with some terminology. Revenues are inflows of assets received in exchange for products/services provided to customers. Revenue is affected by some factors such as units of output sold, selling prices, and levels of marketing costs, which are called revenue drivers. Costs can be defined as a resource sacrificed or forgone to achieve a specific objectives and a cost driver as any factor that affects costs, that is, a change in the cost drivers will cause a change in the total costs of a related cost object. Examples of cost drivers include units of output manufactured, number of sales visits made, and number of packages shipped. In this chapter, we assume total costs (also termed total expenses) are made up of only two categories: variable costs or variable expenses (variable with respect to units of output) and fixed costs or expenses.

1. Total Costs. Total cost is the sum of total variable and fixed costs.

Total Costs (*Expenses*) *Variable Costs* (*Expenses*) *Fixed Costs* (*Expenses*)

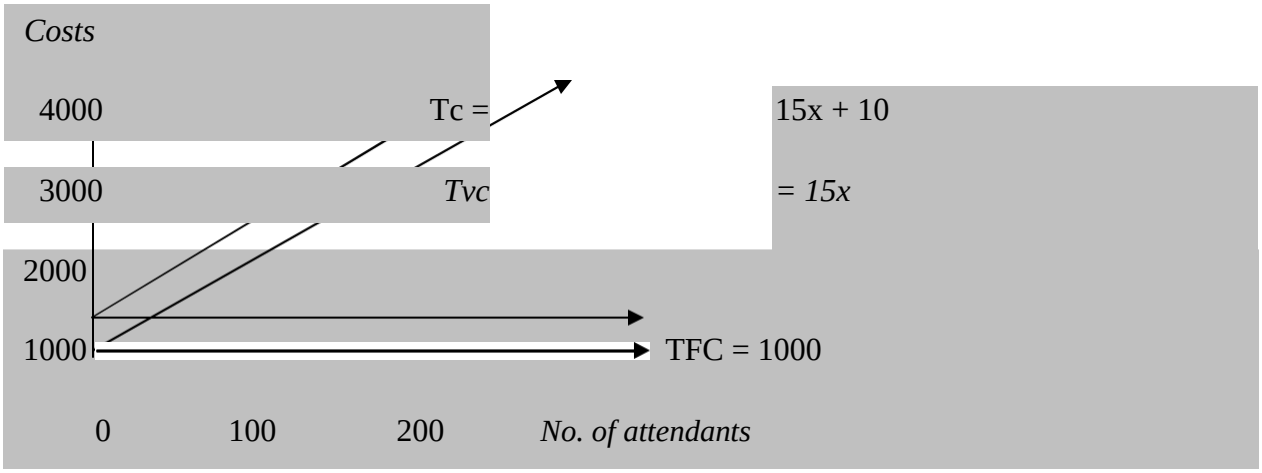
At an activity level of zero, total costs equal the fixed cost. This is because total variable cost will be nil at this level of activity. Hence the total cost curve starts from the level of fixed costs (see below).



In the above example, we can assume a range of values for the number of party attendants (x) to represent costs on a two dimensional plane.

X	50	75	100	125	150	175	20
TVC = 15x	750	1,125	1,500	1,875	2,250	2,625	3,000
Fixed Cost	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Tc = 15x + 1,000	1,750	2,125	2,500	2,875	3,250	3,625	4,000

Graphically the variable, fixed and total costs are shown below.



Note that the total cost and the total variable cost curves are parallel to each other. This is because, both curves has the same slope (i.e. 15). Hence, the change in both the total and variable cost in relation to a change in activity level is the same.

Exercise 1. Explain briefly the behaviors of fixed and variable costs in relation to changes in volume of activity.

Exercise 2. Show the following on a graph.

(a) TC = Birr 65q + 2000

(b) TC = Birr 20q + 100

2. Operating income is total revenues from operations minus total costs from operations (excluding income taxes).

   Operating Income Total Re*venues Total Costs* (*Expenses*)

3. Net income is operating income plus non operating revenues (such as interest revenue) minus non operating costs (such as interest costs) minus income taxes. Thus, net income will be computed as follows:

   Net Income Operating Income Income Taxes

4. Unit Contribution Margin. Unit Contribution Margin = Selling price/unit - Variable cost/unit

5. Total Contribution Margin. Total Contribution Margin = (Sales revenue) - (Total variable costs)

6. Target Contribution Margin. Target contribution margin refers to the desired level of the excess of sales over variable costs. Target Contribution Margin = Fixed Costs + Target Profit

7. Volume target. This is the desired level of activity (sales revenue or sales units).

$$Volume\ T\text{arg}\ et \quad \frac{Contributi\ on\ M\text{arg}\ in\ T\text{arg}\ et}{Unit\ Contributi\ on\ M\text{arg}\ in}$$

Managers to evaluate performance, to prepare budgets, to evaluate decisions, and to monitor and control business activities, use cost behavior information. Among the important uses of cost behavior information is cost-volume-profit (CVP) analysis that deals with the way costs and profits change as the volume of activity changes. Cost-volume-profit analysis ranges from simple break-even analysis to complex analysis with multiple products and many changes in variables.

Many people agree that the primary objective of a business firm is to maximize the level of profits. A firm will produce profit if it is able to generate income (revenue) from its activities that is more than enough to cover both the variable and fixed costs. Hence, the objective of a firm implies that the firm should maximize the difference between sales/revenues and costs.

☞ Quick Check exercise

Distinguish between operating income and net income.

Define contribution margin, contribution margin per unit, and contribution margin percentage.

Exam. 1. Alpha trading has the following summary of trading performance for the last two periods of accounts.

	Period 1	Period 2
Sales	Birr 6,000	Birr 8,000
Variables Costs	3,000	4,000
Contribution Margin	3,000	4,000
Fixed Costs	3,000	3,000
Profits	0	1,000

During Period 1, Alpha Trading has made no profit and no loss. This was due to the fact that the sales revenue (i.e. Birr 6,000) didn't produce excess amount over the total costs (Birr 6,000). During period 2, however, Alpha made a profit of Birr 1,000 since the sales revenue (i.e. Birr 8,000) was in excess of the total costs (i.e. Birr 7,000) by the amount of the profit. As you can observe from the summary results of Alpha, though the volume of sales has changed from Birr 6,000 during period 1 to Birr 8,000 during period 2 some costs remained unchanged from Birr 3,000 in both periods (hence, fixed costs). On the other hand, some costs (variable), increased from Birr 3,000 (period 1) to Birr 4,000 (period 2) in relation to the change in the volume of activity.

Fixed costs, being constant for the relevant range of activity level, are less important for profit planning. Having the objectives of maximizing profit, the firm’s concern will be widening the

gap (difference) between sales revenue and variable costs. This will effectively maximize the amount of the excess of sales over costs, hence profit.

The amount of the difference of sales value and variable costs is known as contribution margin. The underlying concept is that the remaining portion of sales after covering the variable costs will "contribute" certain amount to cover part or all of the fixed costs.

In Example 1, Alpha's period 2 sales value (Birr 8,000) had contributed Birr 4,000 to cover the fixed costs (Birr 3,000) remaining after it has covered variable costs that amount to Birr 4,000. Alpha produced a profit of Birr 1,000 during period 2 since its contribution margin (i.e. Birr 4,000) is more than enough to cover its fixed costs. However, during period 1, Alpha made no profit and no loss since contribution margin was not greater but equal to its fixed costs. Thus, break-even point is an activity level at which the firm will make neither profit nor loss. In other words, break-even point is an activity level at which revenue generated from business equals total costs incurred. Any firm, before it desires to earn a profit, must "break-even". If the firm's volume of sales is below the break-even, it will suffer a loss. Therefore, to make profit, the volume of sales should be greater than the break-even level.

In the example above, the break-even level of Birr sales for Alpha is Birr 6,000, that is, this sale amount enables Alpha Trading not to make loss and profits as well. Alpha, under the current condition, will be able to make profit if its sales exceed Birr 6,000 (the break-even Birr sales). If its sales get below Birr 6,000, it will be unable to even cover its costs and, therefore, incurs loss.

1.5 Applying Cost-Volume-Profit Analysis

Cost-Volume-Profit (CVP) analysis is a profit planning approach that enables one to observe the relationship among costs, volume, prices and profit.

The five cost behavior patterns discussed in previous duties-fixed costs, variable costs, mixed costs, semi-variable costs, and step costs-are all useful in helping managers evaluate performance and make informed decisions. The primary impediment of the use of cost behavior data in business is the lack of accurate cost behavior data. The general ledgers of most businesses are arranged along functional business lines such as manufacturing, administration, marketing, or computer services. Therefore, it is usually necessary for managers to analyze cost data from the

ledger in order to determine how specific costs behave. *Once the manager has separated costs into fixed and variable elements, what does he/she do with the data?* To answer this question will require most of the remainder of cost and management accounting course, since everything the manager does rests in some way on an understanding of cost behavior. One immediate and very significant application of the cost behavior is found in a new format to the income statement known as the *contribution approach*. The unique thing about the contribution approach is that it provides the manager with an income statement geared directly to cost behavior. The *traditional approach* to the income statement, such as you studied in principle of accounting or in financial accounting is not organized in terms of cost behavior. Rather it is organized in a "functional" format emphasizing the functions of production, administrative, and sales in the classification and presentation of cost data. No attempt is made to distinguish between the behaviour of costs included under each of functional heading. Under the heading "Administrative Expense" for example, one can expect to find both variable and fixed costs lumped together.

Although an income statement prepared in the functional format may be useful for external reporting purposes, it has serous limitations as far as usefulness internally to the manager is concerned. Internally, the manager needs cost data organized in a format that will facilitate the carrying out of major responsibilities of planning, control, and decision-making. As we shall see in this chapter and in chapters ahead, these responsibilities are discharged most effectively when cost data are available in a fixed and variable format. The contribution approach to the income statement has been developed in response to this need. Table given below presents a model of the contribution approach to the income statement, along with the traditional approach, which you are already familiar.

Comparison of the Contribution Income Statement with the Traditional Income Statement

Traditional Approach (costs organized by function)		Contribution Approach (costs organized by behaviour)		
Sales	Birr	Sales		Birr
Less Cost of Goods Sold	600,000			600,000
	420,000	Less Variable Expenses		
Gross Margin	180,000	Variable production	220,000	360,000

Less Operating Expense			Variable selling	110,000	
Selling			Variable	30,000	
120,000			administrating		
Administrative	30,000	150,000	Contribution margin		240,000
			Less Fixed expenses		
			Fixed production	110,000	
			Fixed selling	90,000	
			Fixed administrative	10,000	210,000
Net Income		Birr 30,000	Net Income		Birr 30,000

Notice that the contribution approach separates costs into fixed and variable categories, first deducting variable expenses from sales to obtain what is known as the contribution margin. The term contribution margin can be defined as the amount remaining from sales revenues after the variable expenses have been deducted that can be used to contribute toward the covering of fixed expenses and toward profits for the period. The contribution approach to the income statement is widely used as an internal planning and decision-making tool. Its emphasis on costs behavior facilitates cost-volume-profit analysis, such as we shall be doing in this chapter. The approach is also very useful in *appraisal of management performance, in segmented reporting of profit data, in budgeting, and in organizing data pertinent to all kinds of special decisions,*

such as product line analysis, pricing, use of scarce resources, and make or buy analyses. All o these topics are covered in later chapters.

1.6 CVP Analysis Assumptions

Several limiting assumptions must be made when using data for CVP analysis. CVP is built on simplifying assumptions about revenue and cost behavior patterns. Thus, the CVP analysis that we now discuss is based on the following assumptions:

a. Total costs can be divided into a fixed component and a component that is variable with respect to the level of output. When a cost changes in direct proportion to changes in volume, it is called a *variable cost*. Variable costs vary in a proportionate and parallel pattern with volume. Mathematically, a linear relationship exists between a variable costs and volume. If volume increases (or decreases) by 10 per cent, variable cost would also increase (or decrease) by 10 per cent. When a cost does not change with change in

volume, it is called fixed cost. Fixed costs remain at the same level irrespective of the changes in volume.

b. The behavior of total revenues and total costs is linear (straight line) throughout the entire relevant range. The economists would differ from this view. They would say that changes in volume would trigger changes in both revenues and costs in such a way that relationships will not remain linear.
c. The unit selling price, unit variable costs, and fixed costs are known.
d. The analysis either covers a single product or assumes that a given revenue mix of products will remain constant as the level of total units sold changes
e. All revenues and costs can be added and compared without taking into account the time value of money.
f. *Synchronized production and sales*-Inventories do not change in breakeven analysis; that is, the number of units produced equals the number of units sold.
g. Worker and machine productivity and efficiency do not change throughout the relevant range.

These CVP assumptions clearly are extreme in the sense that they would rarely match reality. Managers should always question whether a more complicated approach than CVP is warranted (acceptable or reasonable).

☞ Quick Check exercise

Describe the assumptions underlying CVP analysis.

Illustration of CVP-analysis

Managers to evaluate performance, to prepare budgets, to evaluate decisions, and to monitor and control business activities, use cost behavior information. Among the important uses of cost behavior information cost-volume-profit (CVP) analysis that deals with the way costs and profits change as the volume of activity changes. Cost-volume-profit analysis ranges from simple break-even analysis to complex analysis with multiple products and many changes in variables.

Our study of CVP analysis begins where our study of cost behavior in the preceding chapter left off-with the contribution income statement discussed. The contribution income statement has a number of interesting characteristics that can be helpful to the manager in trying to judge the

impact on profits of changes in selling price, cost, or volume. To demonstrate these characteristics, we shall use the following income statement of ABC Company, a small manufacturer of Shoes:

ABC Company
Contribution Income Statement
For the Month of October 2005

	Total	Per Unit
Sales (400 shoes)	Birr 100,000	Birr 250
Less variable expenses	60,000	150
Contribution margin	40,000	Birr 100
Less fixed expenses	35,000	
Net Income	Birr 5,000	

For purpose of discussion, we shall assume that ABC Company produces only one model of shoe. Notice that the company expressed its sales, variable expenses, and contribution margin on a per unit basis as well as in total. This is commonly done on those income statements prepared for management's use internally, since as we shall see, it facilitates profitability analysis.

As explained above, contribution margin is the amount remaining from sales revenues after the variable expenses have been deducted that can be used to contribute toward the covering of fixed expenses and toward profits for the period. Notice the sequence here-contribution margin is used first to cover the fixed expenses, and them whatever remains after the fixed expenses are covered goes toward profits. If the contribution margin is not sufficient to cover the fixed expenses, then a loss occurs for the period. A negative contribution margin resulted when the selling price is less than variable costs, i.e., the company have failed to cover its variable cost let alone the fixed costs. In the case, that is, when there is negative contribution margin, the change of fixed costs may not have any relevance or have any impact on breakeven point; rather reducing fixed costs may minimize the pain of the company from ending with large losses.

Exam. 2. To illustrate, assume that by the middle of a particular month ABC Company has been able to sell only 100 shoes. At that point, the company's income statement will appear as follows:

	Total	Per Unit
Sales (100 shoes)	Birr 25,000	Birr 250
Less variable expenses	15,000	150
Contribution margin	10,000	Birr 100
Less fixed expenses	35,000	
Net Loss	Birr (25,000)	

For each additional shoe that the company is able to sell during the month, Birr 100 more in contribution margin will be become available to help cover the fixed expenses. If one more additional shoe is sold for example, then the total contribution margin contribution margin will increase by Birr 100 (to a total of Birr 10,0000 and the company's loss will decrease by Birr 100, to Birr 24,900.

If enough shoes can be sold to generate Birr 35,000 in contribution margin, then all of the fixed costs will be covered and the company will have managed to at least break even for the month, i.e., to show neither profit nor loss but just cover all of its costs. To reach this break-even point (the point where contribution margin total equals total fixed expenses or costs), the company will have to sell 350 shoes in a month, since each shoe yields Birr 100 in contribution margin. Once the break-even point has been reached, net income will increase by the unit contribution margin for each additional unit sold. If 351 shoes are sold in a month, for example, then we can expect that the net income for the month will be Birr 100, since the will have sold one shoe more than the number needed to break even. If 352 shoes are sold (two shoes above the break-even point), then we can expect that the net income for the month will be Birr 200, and so forth. To know what the profits will be at various levels of activity, therefore, it is not necessary for a manager to prepare a whole series of income statements. The manager can simply take the number of units to be sold over the break-even point and multiply that number by the unit contribution margin.

CVP analysis can be used to examine how various "what-if" alternatives being considered by a decision maker affect operating income. The breakeven point is frequently one point of interest in this analysis or in breakeven analysis. The breakeven analysis is the most widely known form

of CVP analysis, and many use these terms interchangeably. Breakeven analysis or CVP analysis is a specific way of presenting and studying the inter-relationship between costs, volume, and profits. It provides information to management in a most lucid and precise manner. Managers wish to avoid the stigma (shame or dishonor) of making a loss. The *breakeven point* is that quantity of output where total revenues and total costs are equal, leaving no profit or loss or where operating income is zero. The breakeven point may be computed for a product, a group of products, a division, an entire company, or any other carefully defined objective.

The breakeven analysis indicates the level of sales at which costs and revenues are in equilibrium. It is the equilibrium point that is commonly known as a *breakeven point*. That is, the breakeven point is that point of sales volume at which revenues from the product equal the total costs of producing, selling, and distributing the product. Both the fixed and the variable costs of manufacturing and non-manufacturing operations must be included in the calculation of the breakeven point. It should be noted, however, that the breakeven point is just incidental in CVP studies. The more significant aspects of the CVP analysis is to examine the effect of changes in costs, volume, and selling prices on profits. For the break-even point to occur, it is necessary that a firm have both variable and fixed costs. If all costs of the firm were variable, no-profit, no-loss situation would arise at zero sales volume and profit would vary proportionately with sales. On the other hand, if all costs of the firm were fixed, profit even would occur at a point where revenues are equal to total fixed costs and afterwards, profit would be equal to the sales revenue. Using the information in the following example, let us see the three methods/tools that can be used for determining the break-even point: the equation method, the contribution margin, and the graph method.

The following abbreviations are use full in subsequent analysis:

USP= Unit selling price

UVC= Unit variable costs

UCM= Unit contribution margin (USP-UVC)

CM % = Contribution margin percentage (UCM USP)

FC = Fixed costs

Q = Quantity of out puts units sold (and manufactured)

OI = Operating income

TOI = Target operating income

TNI = Target net income

These approaches are discussed below.

Exam. 3. XYZ Company manufactures and sells Floppy diskettes. Present sales output is 600,000 units per year at a selling price of Birr 3 per unit. Fixed costs are Birr 480,000 per year and the variable costs are Birr 2 per unit.

1. Equation Method

The equation method centers on the contribution approach to the income statement illustrated earlier in the chapter. The first approach for computing the break-even point is the equation method. The break-even point can be expressed in terms of units, or in terms of value (Birr s, Birr s, or euros) of sales volume.

IN UNITS, The break-even point may be calculated for a single product firm in terms of units of output. The break-even point in terms of units will be reached when units sold create sufficient revenue to cover their total costs-fixed and variable costs. Each unit of the product sold will cover its own variable cost and leave a remainder, called contribution margin, to cover fixed costs. The break-even point will occur when enough units have been sold so that total contribution is just equal to the total fixed costs. Note that contribution per unit is the difference between selling per unit and variable cost per unit; total contribution margin is equal to unit contribution multiplied by units sold; and profit is derived/result when fixed cost is subtracted from total contribution. Using the terminology given above, the income statement can be expressed in equation form as follows:

Total Re *venues Variable Costs Fixed Costs Operating Income*

(*USP x Q*) (*UVC x Q*) *FC OI Since OI* 0

(*USP x Q*) (*UVC x Q*) *FC*

Total Contribution *FC*

1

Setting operating income equal to zero (that is at a break-even point the operating income is zero), we can obtain

Birr 3Q - Birr 2Q – Birr 480,000 = 0

Birr 1Q = Birr 480,000

$$Q = 480{,}000 \text{ units}$$

If XYZ sells less than 480,000 units, it will have a loss; if it sells 480,000 units, it will break-even; and if it sells more than 480,000 units, it will make profit.

IN BIRR S, The break-even point for a single product firm can also be computed in terms of Birr /Birr value of sales volume. The break-even point in terms of Birr /Birr value of sales volume can be computed using the following formula.

$$\textit{Break even po}\ \text{int}\ (\textit{Dollars}) \quad \frac{\textit{Total Fixed Cost}}{1 - \dfrac{\textit{VC per unit}}{\textit{SP per unit}}} \qquad 2$$

Substituting the data of Example 1 in this equation, we get,

$$\textit{Break even po}\ \text{int}\ (\textit{Dollars}) \quad \frac{\$480{,}000}{1 - \dfrac{\$2}{\$3}} \quad \frac{\$480{,}000}{0.333333} \ \$1{,}440{,}000$$

The same answer could be obtained by multiplying the breakeven level of units by the selling price per unit. After the breakeven points in units sold has been computed, the breakeven point in sales Birr s can be computed by multiplying the breakeven level of units by the sales price per unit Birr 1,440,000 (480,000 units x Birr 3). The advantage of Equation (2) is that it can be used with both per unit information as well as the total information. This is so because the variable cost and sales revenue change in direct proportion to sales volume. Using total sales and total variable costs information, Equation (2) is particularly significant for the multiproduct firms. These firms find difficulties in measuring volume in terms of any common unit of products.

2. Contribution Margin Method

The contribution margin method is actually just a variation of the equation method already described. The approaches centers on the idea discussed earlier that each unit sold provides a certain amount of contribution margin that goes toward the covering of fixed costs. Recall that we have defined contribution margin before as the amount remaining from sales revenues after the variable expenses have been deducted that can be used to contribute toward the covering of fixed expenses and toward profits for the period. Initially, the contribution margin covers fixed costs, but once the break-even point is reached, the contribution margin provides income. Thus, contribution margin can be computed as follows:

$$(USP \ x \ Q) \ (UVC \ x \ Q) \ FC \quad OI$$

$$(USP \ UVC) \ x \ Q \ FC \ OI \qquad Note \ that \ UCM (USP \ UVC)$$

$$UCM \ x \ Q \ FC \ OIQ \qquad \frac{FC \ OI}{UCM}$$

Using the contribution margin that can be computed as shown above, the break-even point can be computed as follows. At the break-even point, operating income is, by definition, zero. Setting OI = 0, we obtain

$$Break \quad evenUnits \quad \frac{FC}{Unit \ Ccontribut \ ion \ M \ \text{arg} \ in}$$

It can be observed from this equation that it is necessary that the selling price be greater than the variable cost per unit (that is, *unit contribution margin be positive*) for a *positive* break-even point to occur. Mathematically, if the selling price is less than the variable cost per unit (that is, *negative unit contribution margin*), a solution for a break-even point in terms of negative sales volume does exist; but the negative sales volume in practice is an unacceptable solution. In the case of the selling price equals variable cost per unit, no break-even point can exist unless the firm has zero fixed costs. Under zero fixed costs situation, every sales volume point will be a break-even point, because revenue would be exactly equal to total costs at any sales volume. The calculations in the equation method and the contribution margin method appear similar because one is merely a restatement of the other. In our example, fixed cots are Birr 480,000 and the unit contribution margin is Birr 1 (Birr 3 - Birr 2). Therefore,

$$Break \quad evenUnits \quad \frac{\$480,000}{\$1} \qquad 480,000 \ Units$$

The approach to breakeven analysis is particularly useful in those situations where a company has multiple product lines or products and wishes to compute a single breakeven for the company as a whole. More is said on this point in a later section entitled “Multiple Products and CVP analysis”

Contribution margin is a key concept in this chapter. We now consider how it is related to the gross margin concept. The definition of contribution margin and gross margin are given below. *Contribution margin* is total revenues less all costs that vary with respect to no. of output units, whereas g*ross margin* is total revenues less cost of goods sold

The phrase “all costs that vary” refers to variable costs in each of the business functions of the value chain (research and development, product/service/process design, marketing, distribution, and customer service). Cost of goods sold in the manufacturing sector consists entirely of manufacturing costs (including fixed manufacturing costs). Fixed manufacturing costs are not deducted from revenues when computing contribution margin but are deducted when computing gross margin. Variable manufacturing costs are deducted from revenues when computing contribution margin but are not deducted when computing gross margins. Both contribution margin and gross margin can be expressed as totals, as an amount per unit, or as percentages. The contribution margin percentage is the total contribution margin divided by revenues. The variable-cost percentage is the total variable costs (with respect to units of output) divided by revenues. The contribution margin percentage in our XYZ Company example (Example 1) is

33.33% (Birr 600,000 Birr 1,800,000), while the variable-cost percentage is 66.67% (Birr 1,200,000 Birr 1,800,000). The gross margin percentage is the gross margin divided by revenues.

CONTRIBUTION RATIO, an analysis of Equation (2) and the example above provide an insight into the mechanism of the break-even point. In some CVP analysis, specific unit selling price and variable cost data are not available. For example, an analyst may have only data on total sales and total variable costs without any information on number of units sold. When variable expenses or costs (per unit or total) are divided by sales (selling price or total), we get *variable cost ratio*. Thus, the 0.6667 or 66.67% (Birr 2/Birr 3) derived in the above example shows that variable costs are 66.67% of sales, or stated in another words, Birr 0.6667 of every one Birr sales recoup or recover the variable costs. We derive the *contribution ratio,* when the variable cost ratio is subtracted from one or when contribution is divided by sales. Thus, the formula for contribution ratio may be written as follows:

$$Contributionratio\frac{Sales\ VariableCost}{Sales}\ 1\quad\frac{VariableCost}{Sales}\qquad\qquad 3$$

Note that the denominator of Equation (2) is the contribution ratio. For example, the 0.3333 (i.e., 1- 0.6667) derived in the above example shows that 33.33% of sales is a variable to cover fixed

costs and generate profits. In other words, Birr 0.3333 of each Birr sales is available to cover fixed costs and earn a profit. Since profit at the break-even point is zero, dividing fixed costs by the contribution ratio gives the sales Birr s that is necessary to cover fixed cost:

$$Break\ even\ point \quad \frac{\$480,000}{} \quad \$1,440,000$$

Equation (2) can be rewritten as:

$$Break\ even point(Dollars) \quad \frac{TotalFixedCost}{Contributionratio} \qquad 4$$

Note that the contribution ratio is also known as P/V ratio where P represents profit as an equivalent of contribution and V represents volume as an equivalent of sales. Thus:

$$Break\ even\ point\ (Dollars) \quad \frac{Total\ Fixed\ Cost}{}$$

3. Graph Method-Graphic CVP Analysis

Many mangers find that graphic analysis and representations of accounting information are more informative and more quickly understood than conventional accounting reports. The relationship between total costs and total revenue can be shown graphically in cost-volume-profit graph, also called a cost-volume-profit chart or CVP chart, such as the one illustrated for XYZ Company in the figure below. A CVP graph can be very helpful in that it highlights CVP relationships over wide ranges of activity and gives managers a perspective that can be obtained in no other way. Such graphing is sometimes referred to as preparing a breakeven chart. In the graph method, we plot the total costs line and the total revenues line. There point of intersection is the break-even point. Commonly cited advantages of graphic representations are:

Managers with a low tolerance for financial data often are able to understand financial information presented graphically.

A range of activity rather than a static situation can be presented.

More information can be presented and understood without information overload.

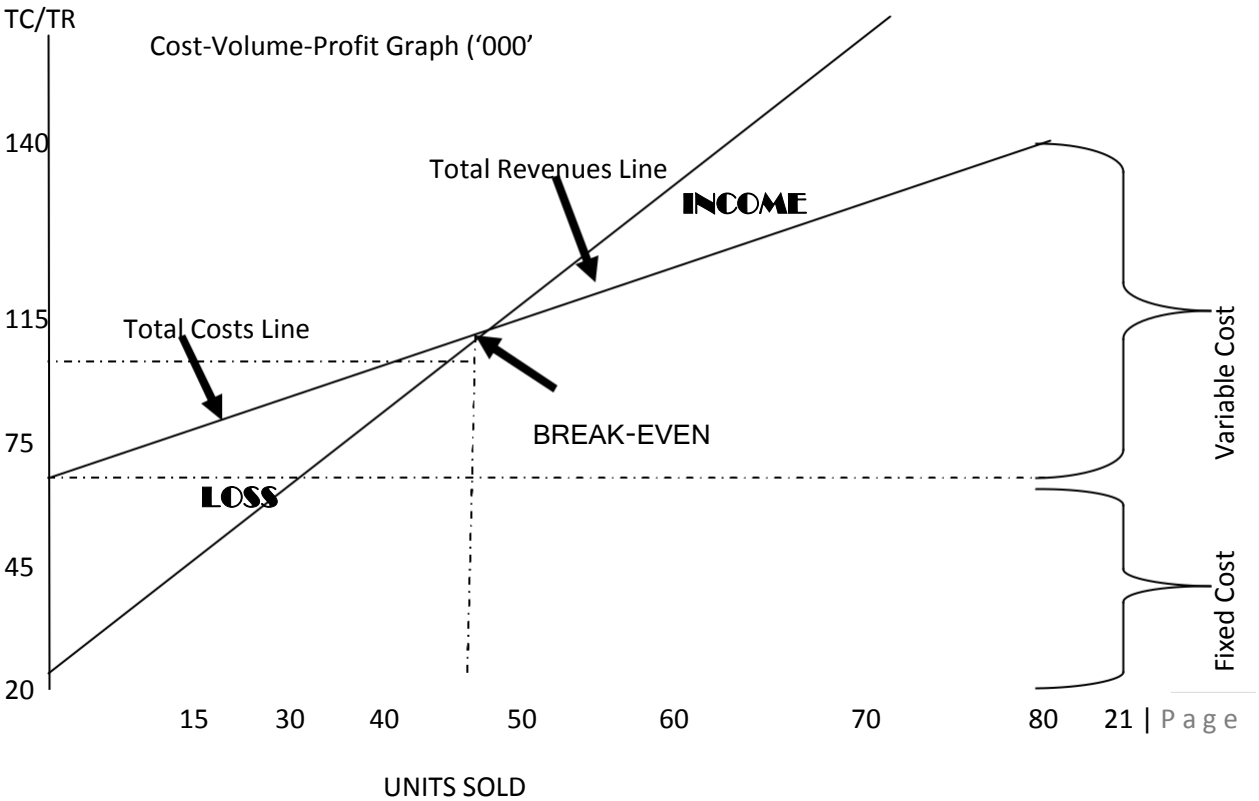
The solutions to some complex analysis are made simpler and more understandable.

We need only two points to plot each line if each is assumed linear:

a. *Total Cost Line*- This line is the sum of the fixed costs and variable cost. Fixed costs are Birr 480,000 at all output levels within the relevant range. To plot the total costs line, use as one point the Birr 480,000 fixed costs at o output units. Select a second point by choosing any other convenient output level (say, 40,000 units) and determine the corresponding total costs. The total variable costs at this output level are Birr 80,000 (Birr 2 x 40,000). Hence, total costs at 40,000 units are Birr 560,000. The total costs line is straight line as can be seen in the graph.

b. *Total Revenues Line*-One convenient starting point is zero revenues at the zero output level. Select a second point by choosing any other output level and determining its total revenues. At 40,000 units of output, total revenues are Birr 120,000 (Birr 3 x 40,000). The total revenues line is straight line as can be seen in the graph.

The break-even point is where the total revenues line and the total costs line intersect. At this point, total revenues equal total costs. One limitation of graphs is that it is often difficult to determine a precise answer to break-even or other CVP analysis. Poorly drawn graphs be of little use to managers. However, for managerial purposes, visualizing CVP relationships is more important than computing precise answers.



1 Reviewing Additional Uses of Cost-Volume-Profit Analysis

For a new firm or new product line, breaking even may be an important short-term goal, however, there are other objectives in business that can be evaluated effectively using CVP analysis, including:

1. Achieving a target operating income
2. Changing fixed costs
3. Changing variable costs
4. Changing selling price

☞ Quick Check exercise
5. Changing management strategies

Describe three methods that can be used to express CVP relationships

Exam. 4. To illustrate how the CVP analysis help to determine the level of Activity necessary achieve a target level of profit of course after the fixed costs covered, the effect of change in other variables on profit, we will use Christian Milan Company's data. Christian Milan Company is evaluating the introduction of a new lawn sprinkler with expected selling price of Birr 5 per unit, variable cost of Birr 3 per unit, and fixed cost of Birr 10,000.

1. Achieving a Target Operating Income. Although breaking even is a desirable initial hurdle or jump over, it is not the ultimate goal of a profit-seeking enterprise. Investors do not commit resources to businesses that promise zero return. Instead, managers strive to earn a profit that yields an acceptable level of return on owner's investments. CVP analysis can be used to determine the level of activity necessary to cover fixed costs and achieve a target level of profit. If a target income is expressed in a Birr amount, it is merely added to the fixed cost and the required activity level is computed. To illustrate, Christian Milan Company decides that Birr 8,000 of net income is required. The number of lawn sprinklers needed to earn Birr 8,000 of income is:

Let QT Number of units sold to earn targe t income
T arg *et* *Income* *Total* Re *venues* *Total* *Costs* (*Expenses*)

$ 8,000 $ 5 *x* *QT* $ 3*QT* 〈 〉 $ 10 ,000

$2*QT* $8,000 $ 10 ,000 9,000 *Units*

or 9,000 *x* $ 5 $ 45 ,000 *of* *sales*

Thus, as determined above using the equation method the target operating income can be achieved by selling 9,000 units per year, which represents Birr 45,000 in total sales (Birr 5 x 9,000 units). Alternatively, we could use the contribution margin method. The numerator now consists of fixed costs plus target operating income:

$$QT \quad \frac{FC \;\; T\text{arg}et\ Operating\ Income}{Unit\ Contributi\ on\ M\text{arg}in} \qquad QT \quad \frac{\$10{,}000 \;\; \$8{,}000}{\$5 \;\; \$3} \; 9{,}000 \; Units$$

This approach is simpler and more direct than using the equation method. In addition, it shows clearly that once the fixed costs are covered, the unit contribution margin is fully available for meeting profit requirements.

Target income may be expressed as a percentage of sales revenue rather than a Birr amount of income. In the above example, suppose that the desired target income is 20% of total sales revenue and variable cost is 60% of the selling price per unit. The required level of activity to achieve the target income is

$$\text{Let } Y \quad \text{sales dollar} \qquad \text{to earn targe t income}$$

$$0.2YY0.6Y \qquad \langle \qquad \rangle \$10{,}000 \quad Y \quad \$50{,}000$$

$$or \qquad \frac{\$50{,}000}{\$5 \; per\ unit} \; 10{,}000 \quad units$$

The problem can also be solved in units directly by noting that the target net income is 20% of selling price, 20% of Birr 5 = Birr 1. That means Birr 1 of each sales revenue is designed as required net income. Then

$$\text{Let QT} \quad \text{Number of units sold to earn targe t income}$$

$$\$1QT \quad \$5QT \quad /\$3QT \setminus \quad \$10{,}000 \qquad QT \quad 10{,}000 \; Units$$

The selling price may change because of the economic factors or management itself may initiate a change due to increase or decrease in costs or competition or for some other reasons. Most costs are controllable by the firm and are affected by volume changes, technological improvement, efficient use of resources or changes in prices of raw materials or wage rate. The ultimate impact of changing factors is on the firm's profits. Therefore, management must evaluate influences of these changes on profit.

2. Effect of Changes in Fixed Costs The tem fixed cost implies costs that do not change with volume. However, many fixed costs are discretionary and can be changed in the near future if management desires. In addition, managers often know about some fixed costs, such as property taxes, that are expected to increase in the near future. Managers often use cost-volume-profit analysis when evaluating discretionary cost decisions or planning for a new committed fixed cost, such as property taxes increase. A change in fixed costs *does not influence P/V ratio*. Other factors remaining unchanged, a fall in fixed costs will, however, lower the break-even point, and raise profits. An increase in fixed costs either caused due to some external factors or due to some change in the management policy, will wais the break-even point. Increase in factory rent or insurance and taxes are examples of external factors, while increased depreciation or salaries of managers may be the result of management decisions. The analysis of fixed costs incorporates any anticipated fixed cost changes into the CVP equation. Continuing our example (Example 2), assume that fixed costs for the next year are expected to increase by Birr 5,000. The new fixed cost used in the analysis is Birr 15,000, the new break-even point is

$5*Q* $3*Q* $15,000 *Q* 7,500 *Units*

The CVP effect of the increase in fixed cost can be evaluated by dividing the expected fixed cost increase of Birr 5,000 by the contribution margin of Birr 2 per unit. The result is 2,500 units, the amount that the break-even point must increase from the original level of 5,000 units [Birr 10,000 (Birr 5-Birr 3] to accommodate the higher fixed cost. Using this approach, the new break-even point is

New Q Old Q Q required to cover additional fixed cost

New Q 5,000 *units* 2,500 *units* *New Q* 7,500 *Units*

3. Effect of Changes in Variable Costs The costs of raw materials, labor, and other variable costs of production resources often change as resource prices increases or production efficiencies change. Changes in variable costs are incorporated into the CVP analysis with a simple modification in the variable cost component of the break-even equation. The impact of the changes in variable costs on profits is straightforward if it does not cause any change in selling price and/or volume. An increase in variable costs will lower P/V ratio, push up the break-even point, and reduce profits. On the other hand, if the variable costs decline, P/V ratio will increase,

break-even point will be lowered and profits would rise. For example, if variable costs increase by Birr .75 per unit, the unit variable cost is Birr 3.75. The calculation of the break-even point is

$\$5Q \quad \$3.75Q \quad \$10{,}000 \quad Q \quad 8{,}000$ *Units*

The Birr .75 increase in variable cost is 15% (Birr .75 Birr 5) of the selling price; but it is also 37.5% (Birr .75 Birr 2) of the original Birr 2 contribution margin. The new, lower contribution margin results in a higher break-even volume. It takes more units of sales to cover the Birr 10,000 of fixed costs.

4. Effect of Price Changes A change in the selling price has an effect on the break-even point similar to that caused by a change in variable cost. They both affect the contribution margin needed to cover the fixed cost. An increase in the selling price will increase the P/V ratio and, as a result, will lower the break-even point. On the contrary, a decrease in the selling price will reduce the P/V ratio; therefore, result in a higher break-even point. For instance, if a market conditions require a Birr .40 drop in the price of the product, to Birr 4.60, the new break-even point is

$\$4.60Q \quad \$3Q \quad \$10{,}000 \quad Q \quad 6{,}250$ *Units*

or

6,250 *units x* \$4.60 *per unit* \$28,750 *of sales*

5. Effect of Changes in a Combination of Factors (Changing Management Strategies) By evaluating the changes in cost-volume-profit variables individually, it is easy to see the effect of each on the break-even point. In practice, however, several variables change simultaneously. Multiple changes are not difficult to analyze, but sometimes it is difficult to visualize the impact of several changes at once. The financial manager or the management accountant, evaluating the profit plans or budgets, must realize that a change in one factor leads to a change in another factor or factors. Therefore, all such changes should be carefully visualized and their net impact on profits must be seen. To illustrate multiple changes, we combine several changes into a single CVP analysis. Assume that Christian Milan Company's management is facing an increase in labor costs, which would increase variable costs of production. The company has two alternatives that will allow it to maintain its target level of profit of Birr 9,000.

Alternative.1. The first alternative is to acquire new equipment that will automate some of the production and thus reduce variable labor costs. The new equipment would add Birr 20,000 per year to the current annual fixed costs of Birr 10,000, but variable costs would decrease from Birr 3 to Birr 2.60 per unit. The level of sales required to achieve the target profit of Birr 9,000with the first alternative (Alternative.1) is computed as follows:

- Increased fixed costs from Birr 10,000 to Birr 30,000
- Decrease variable costs from Birr 3 to Birr 2.60 per unit
- Achieve target profit of Birr 9,000, with no changes in selling price

$9,000 5QT$ 2.60QT$ $30,000 Q 16,250 *Units*

Alternative.2. The alternative strategy is to increase the price to compensate for the increased cost, but an increase in price may cause a decrease in volume of sales. A change in volume, not accompanied with a change in selling price and/or costs, will not affect P/V ratio. As a result, the break-even point remains unchanged. Profit will increase with an increase in volume and will reduce with a decrease in volume. A change in price invariably (always or consistently) affects the volume, and a price reduction may increase demand of the product and consequently, may result in increased volume. On the other hand, increase in price may adversely affect the demand thus reduce volume. The impact on profit under these circumstances is not oblivious. Profits may increase with a price reduction if volume increases substantially. Similarly, a price rise may reduce profits if there is material fall in volume. Assume that the alternative strategy is to increase the selling price to Birr 5.50 per unit. To counteract any decline in sales volume that may result, a new advertising and marketing campaign would be required that would raise fixed costs by Birr 8,000 per year and variable costs to Birr 4.25 per unit. The level of sales required to achieve the target profit of Birr 9,000with the second alternative (Alternative.2) is computed as follows:

- Increased fixed costs from Birr 10,000 to Birr 18,000
- Increase variable costs from Birr 3 to Birr 4.25 per unit
- Achieve target profit of Birr 9,000, with an increase in selling price from Birr 5 to Birr 5.50.

$9,000 5.50QT$ 4.25QT$ $18,000 Q 21,600 *Units*

The sales required to meet the target net income in the first alternative is Birr 81,250 (the target volume of 16,250 unit times the Birr 5 selling price). Target revenue for the second alternative is Birr 118,800 (21,600 x Birr 5). Which of the two alternatives should the management choose? The computation of target sales levels for the two alternatives does not provide an obvious decision. Other analysis or information is necessary. For example, if the target net income or profit can be reached in either case, the second alternative may be better because it has a greater margin of safety. The concept of margin of safety is discussed later in this chapter. *Cost & Management accounting information provides managers with relevant information for decision-making, but it seldom provides the decision itself.* Instead, managers must use the data from accounting reports and combine them with other information to make intelligent decisions.

1.7 Impact of Taxes on CVP-analysis

When we introduced a target operating income in our above example, the following income statement was used:

Revenues (Birr 3 x 600,000)	Birr 1,800,000
Variable costs (Birr 2 x 600,000)	1,200,000
Contribution margin	600,000
Fixed Costs	480,000
Operating Income	Birr 120,000

The net income as stated before is the operating income less income taxes. What number of units must XYZ sell to earn a net income of Birr 80,000, assuming that operating income is taxed at a rate of 20%? The only change in the equation method of CVP analysis is to modify the target operating income to allow for income taxes. Recall our previous equation method:

$$Total\ \text{Re}venues = Variable\ Costs + Fixed\ Costs + Operating\ Income$$

We now consider the income tax effects:

$$T\text{arg}et\ Net\ Income = (Operating\ Income) - (Operating\ Income) \times (Tax\ Rate)$$

$$Operating\ Income = \frac{T\text{arg}et\ Net\ Income}{1 - Tax\ Rate}$$

Thus, taking income taxes into account, the equation method yields:

$$\text{Total Revenues} - \text{Variable Costs} - \text{Fixed Costs} - \frac{\text{Target Net Income}}{1 - \text{Tax Rate}}$$

$$\$3Q - \$2Q - \$480{,}000 - \frac{\$80{,}000}{1 - 0.20} - Q \qquad \frac{\$480{,}000 + \$100{,}000}{\$1} = 580{,}000 \text{ Units}$$

Proof:

Revenues (Birr 3 x 580,000)	Birr 1,740,000
Variable costs (Birr 2 x 580,000)	1,160,000
Contribution margin	580,000
Fixed Costs	480,000
Operating Income	Birr 100,000
Income Taxes (0.2 x Birr 100,000)	20,000
Net Income	Birr 100,000

The presence of income taxes will not change the breakeven point. This is because, by definition operating income at the breakeven point is zero and thus no income taxes will be paid. Other types of taxes may affect the breakeven point. For example, a sales tax paid by the seller that is a fixed percentage of revenues can be treated as a variable cost and hence will increase the breakeven point.

Quick Check exercise

How does an increase in the income tax rate affect the breakeven point?

1.8 Multiple Product and CVP- analysis

Most companies have several products, and often these products are not equally profitable. Where this true, profits will depend to some extent on the sales mix that the company is able to achieve. The term sales mix means the relative combination in which a company's products are sold. Managers try to achieve the combination, or mix, that will yield the greatest amounts of profits. Profits will greater if high-margin items make up a relatively large proportion of total sales than if sales consist mostly of low-margin items.

Changes in the sales mix can cause interesting (and sometimes confusing) variations in a company's profits. A shift in sales mix from high-margin items to low-margin items can cause total profits to decrease even though total sales may increase. Conversely, shift in sales mix from

low-margin items to high-margin items can cause the reverse effect-total profits may increase even though total sales may decrease. Given the possibility of these variations in profits, one measure of the effectiveness of a company's sales force is the sales mix that it is able to generate. It is one thing to achieve a particular sales volume; it is quite a different thing to sell the most profitable mix of products.

1. Sales Mix and Breakeven Analysis

CVP analysis for multiple product will depend on the mix in which the products are sold. This is because; different products will have different selling prices, different costs, and different contribution margins.

Exam. 5. To illustrate, assume that ABC Company has two products-product X and product Y. For 2004, the company's sales, costs, and breakeven point were as shown in the table below.

Multiple-Product CVP Analysis

	Product X		Product Y		Total	
	Amount	Percent	Amount	Percent	Amount	Percent
Sales (100 shoes)	Birr 25,000	100	Birr 75,000	100	Birr 100,000	100
Less variable expenses	15,000	60	25,000	33.33	40,000	40
Contribution margin	10,000	40	55,000	66.67	60,000	60
Less fixed expenses					10,000	
Net Income					Birr 50,000	

$$Break\ even Units \quad \frac{10,000}{Average\ CM\ Ratio, 60\%} \quad \$16,666.67$$

As shown in the table, the breakeven point is Birr 16,666.67 in sales. This is computed by dividing the fixed costs by the company's average contribution margin for the 60 percent. However, Birr 16,666.67 in sales represents the breakeven point for the company only so long as the sales mix does not change. If the sales mix changes, then the breakeven will also change.

2. Sales Mix and Contribution Margin

Sometimes the sales mix is measured in terms of the average per unit contribution margin.

Exam. 6. To illustrate, assume that Nonacid Company has two products-X and Y. During 2003 and 2004, sales of products X and Y were as shown in table below.

Products	Contribution Marginper Unit	TotalUnits Sold 2003	2004	Total Margin 2003	Contribution 2004
X	Birr 5	1,000	2,000	Birr 5,000	Birr 10,000
Y	3	3,000	2,000	9,000	6,000
		4,000	4,000	14,000	16,000
Average per Unit Contribution Margin (Birr 14,000 4,000 units)				Birr 3.50	
Average per Unit Contribution Margin (Birr 16,000 4,000 units)					Birr 4

Two things should be noted about the data in this table. First, note that the sales mix in 2003 was 1,000 units of product X and 3,000 units of product Y. This sales mix yielded Birr 3.50 per unit of contribution margin. Second, note that sales mix in 2004 shifted to 2,000 units for both products, although total sales remained unchanged at 4,000 units. This sales mix yielded Birr 4 in average per unit of contribution margin, an increase of 50 cents per unit over the prior year. What caused the increase in average per unit of contribution margin between the two years? The answer is the shift in sales mix toward the more profitable product X. Although total volume (in units) did not change, total and per unit of contribution margin changed simply because of the change in sales mix.When a firm produces more than one or two products, break-even and other CVP analysis may require some additional computations as seen before and involve some limiting assumptions. If fixed cost cannot be identified with specific products, then the break-even analysis is performed for the group products.

Exam. 7. To illustrate multiple-product break-even analysis for three products, let us use the following data:

	Product		
	A	B	C
Selling price	Birr 10	Birr 21	Birr 25
Variable expenses	8	14	18
Contribution margin	2	7	7
Contribution margin as a percentage of selling price	20%	33.33%	28%
Percentage of total sales in terms of units	20%	50%	30%

Total fixed expenses Birr 42,000

Each product has a different selling price and variable cost. One problem in computing the break-even point is the lack of a single contribution margin that can be divided into the Birr 42,000 fixed cost to find the break-even point. The problem is solved by computing an average contribution margin based on the expected percentage of total sales for each product. The unit contribution margin of each product is multiplied by its expected percentage of sales as follows:

A Birr 2 x .20 = Birr .40

B 7 x .50 = 3.50

C 7 x .30 = 2.10

Average CM = Birr 6.00

The Birr 6 average contribution margin is the average of the individual product contribution margins weighted by their expected portion of total unit sales.

An alternative method of finding the average contribution margin is to compute the weighted average-selling price and weighted average variable cost and subtract one from the other to find the average contribution margin. The alternative method of determining average contribution margin is shown below. If the computations are based on historical sales and cost data, the results are *weighted averages*. If expected sales and cost data are used in the computations, the results are *expected values*.

Product Sales Frequency Sales Price Expected Value

Average Sales Price

A	.20	Birr 10	Birr 2.00	
B	.50	21	10.50	
C	.30	25	7.50	
Average Sales price				*Birr 20.00*
Average Variable Costs				
A	.20	Birr 8	Birr 1.60	
B	.50	14	7.00	
C	.30	18	5.40	
Average Variable Costs				*Birr 14.00*
Average contribution margin				Birr 6.00

The expected sales price of Birr 20 and the expected contribution margin of Birr 6 do not equal any product price or contribution margin. The expected price of Birr 20 is an *average*. We compute the break-even point for total sales in units as fixed costs divided by contribution margin.

$$\textit{Break even Units} = \frac{\$42,000}{} = 7{,}000 \textit{ total units}$$

The break-even point can be computed in sales Birr s by dividing the contribution margin ratio into the fixed costs. With expected sales price of Birr 20 and expected contribution margin of Birr 6, the contribution margin ratio is Birr 6/Birr 20, or 30%. Break-even in sales Birr s is

$$\textit{Break even po int} = \frac{\$42,000}{\$0.30} = \$140{,}000 \textit{ of total sales}$$

☞ Quick Check exercise

1.9 1.8. CVP Analysis in Service and Nonprofit Organizations

How can a company with multiple products compute its breakeven point?

Thus far our examination of CVP analysis has focused on merchandising companies seeking to make a profit. CVP can also be applied readily to decisions by manufacturing, service, and nonprofit organizations. The key to applying CVP analysis in service and nonprofit organizations is measuring their output. Examples of output measures in various service and nonprofit industries follow.

Industry	Measure of Output
Airlines	Passenger-miles
Hotels/motels	Room-nights occupied
Hospitals	Patient-days
Universities	Student Credit-Hours

Consider a social welfare agency of the government with a budget appropriation (revenue) for year 2000 of $900,000. This nonprofit agency's major purpose is to assist handicapped people who are seeking employment. On average, the agency supplements each person's income by $5,000 annually. The agency's fixed costs are $270,000.It has no other costs. The agency manager wants to know how many people could be assisted in 2000. We can use CVP analysis here by setting operating income to zero. Let Q be number of handicapped people to be assisted:

Revenues-Variable costs –Fixed costs = $0

$900,000 - $5,000Q - $270,000 =$0

$5,000Q = $900,000 -$270,000 =$630,000

Q = $630,000 $5,000 per person = 126 people

Suppose the manager is concerned that the total budget appropriation for 2001 will be reduced by 15% to a new amount of $900,000 x (1 – 0.15) = $765,000. The manager wants to know how many handicapped people could now be assisted. Assume the same amount of monetary assistance per person:

$765,000 - $5,000Q -$270,000 = $0

$5,000Q =$765,000 - $270,000

Q= $495,000 $5,000 per person = 99 people

Note the following two characteristics of the CVP relationship in this non-profit situation:

The percentage drop in service, (126 -99) 126, or 21.4%, is more than the 15% reduction in the budget appropriation. Why? Because the existence of $270,000 in fixed costs means that the percentage drop in service exceeds the percentage drop in budget appropriation.

If the relationships were graphed, the budget appropriation (revenues) amount would be a straight horizontal line of $765,000. The manager could adjust operations to stay within this reduced appropriation in one or more of three basic ways: (a) Reduce the number of people assisted, (b) reduce the variable costs (the assistance per person), or (c) reduce the total fixed costs.

1.10 Contribution Margin versus Gross Margin

Contribution margin is a key concept in this chapter. We now contrast contribution margin with the gross margin concept.

Gross margin = Revenues – Cost of Goods Sold

Contribution margin = Revenues – All Variable Costs

Cost of goods sold in the merchandising sector is made up of goods purchased that are then sold. Cost of goods sold in the manufacturing sector consists entirely of manufacturing costs (including fixed manufacturing costs). The phrase “all costs that vary” refers to variable costs in each of the business functions of the value chain.

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

Merchandise Sector

The most common difference between contribution margin and gross margin for companies in the merchandising sector is variable items not in cost of goods sold (such as salesperson commissions that are a percentage of revenues). Contribution margin is computed by deducting all variable costs from revenues, whereas gross margin is computed by deducting only cost of goods sold from revenues. The following example (figures assumed and in thousands) illustrates this difference:

Contribution income Statement Emphasizing contribution Margin			Financial accounting income statement Emphasizing Gross Margin	
Revenues		$200	Revenues	$200
Variable cost of goods sold	$120		Cost of goods sold	120
Variable operating costs	43	163	Gross margin	80
Contribution margin		37	Operating costs ($43 + $19)	62
Fixed operating costs		19		
Operating income		$18	operating income	$18

Manufacturing Sector

The two areas of difference between contribution margin and gross margin for companies in the manufacturing sector are fixed manufacturing costs and variable non manufacturing costs. The following example (figures assumed and in thousands) illustrates this difference:

Revenues		$1,000	Revenues	$1,000
Variable manufacturing costs	$250		Cost of goods sold	
Variable non manufacturing	270	520	($250 +$160)	410
Contribution margin		480	Gross margin	590
Fixed manufacturing costs	160		Non manufacturing costs	
Fixed non manufacturing costs	138	298	($270 + $138)	408
Operating income		$182	Operating income	$182

Fixed manufacturing costs are not deducted from revenues when computing contribution margin but are deducted when computing gross margin. Cost of goods sold in a manufacturing company includes all manufacturing costs. Variable non-manufacturing costs are deducted from revenues when computing contribution margin but are not deducted when computing gross margin.

Like contribution margin, gross margin can be expressed as a total, as an amount per unit, or as a percentage. For example, the gross margin percentage is the gross margin divided by revenues- 59% ($590 $1,000) in our manufacturing- sector example.

Quick Check exercise

"In CVP analysis, gross margin is a less-useful concept than contribution margin." Do you agree? Explain briefly.

1.11 Utility or Advantages of CVP Analysis

Break-even analysis is the most useful technique of profit planning and control. It is a device to explain the relationships between cost, volume, and profits. The utility of break-even analysis lies in the following advantages:

1. Understanding accounting data. The break-even analysis is a simple concept to comprehend and interpret the accounting data. Many business executives and others are unable to understand accounting data contained in financial statements and reports. When the data is presented though break-even charts, it becomes very easy to grasp and interpret them. However, the executives using break-even analysis should remember the limitations of this device and not attach too much value to it.

2. It is useful diagnostic tool. It indicates to the management the causes of the increasing break-even point and falling profits. The analysis of these causes reveal to the management as to what actions should be taken. As a practical matter, knowledge of where the break-even point lies can be quite useful to the management in determining the need for action. However, an increasing break-even point should not always be a matter of alarm to the management.

3. It provides basic information for further profit & other improvement studies. In the break-even analysis, we compute break-even point, compute P/V ratio, prepare break-even charts and P/V graphs, and report the effect of changing factors on profits. This whole set of information is important to evaluate the reasonableness and usefulness of profit plans, other budgets, and forecasts prepared by the management. The break-even analysis, thus, provides

the basic information for profit improvement studies, and it is a useful starting point for detailed investigations.

4. Risk evaluation. It is a useful method for understanding the risk implications of alternative actions. The desirability of an action should be considered on the basis of its profit as well as risk. If profit alone is considered, a firm may commit to a risky action. The break-even analysis, to some extent, is a useful method of considering the risk implications of alternative actions. The problem of risk evaluation can be approached by considering the effects of the alternative actions on the break-even point. In taking a decision, the firm should not only consider the profit expected from the alternative but also the profitability of reaching the break-even point.

1.12 Limitation of CVP Analysis

The break-even or CVP analysis is a simple and useful concept. However, it is based on certain assumptions, which have been discussed earlier. These assumptions limit the utility and general applicability of the break-even analysis. Therefore, the analyst should recognize these limitations and adjust data, whenever possible, to get meaningful results. The cost-volume-profit analysis suffers from the following limitations:

1. Cost segregation. One of the important prerequisites of the CVP analysis is that costs can be classified as fixed or variable. Some of the costs can be easily identified as fixed, such as rent of building, or variable, such as direct material cost. Nevertheless, a large number of costs belong to the mixed category. Such costs, known as semi-variable or semi-fixed, costs consist of fixed as well as variable elements and are difficult to separate. Furthermore, some costs are difficult to determine, for instance, there are various methods of calculating depreciation and that it is not easy to decide which method is the best.

2. Constancy of fixed costs. The assumption that fixed costs remain constant over the entire volume range is not valid. If a firm has zero output, some of the fixed costs can certainly be reduced or eliminated. For example, some of the supervisors or executives can be dismissed /fired and their salaries can be reduced. On the other hand, if the

company uses idle capacity, additional fixed costs may be incurred. The conclusion is that fixed costs are constant over a relevant range of activity and would increase in a step-wise fashion.

3. Change in unit variable cost. The variable cost per unit also does not remain constant, and therefore, total variable costs don not change proportionately to output (called *non-linear variable costs*). As a company increases its volume of operations, it needs more workers. The workers may be less efficient because of lack of experience or training. If the company does not employ inefficient workers, it may have to put existing workers on overtime and pay costly overtime wages. Similarly, material costs will be less due to purchase discounts and other concessions if the company makes bulk purchases.

4. Change in selling price. Similarly, selling price hardly remains constant. Selling price may remain constant under perfect competition. However, in real market situations of monopolistic competition or oligopoly, selling price will have to be reduced to increase the sales volume. Thus, sales revenue will not change in direct proportion to output.

☞ Quick Check exercise

Why is it more accurate to describe the subject matter of this chapter as CVP analysis rather than as breakeven analysis?

1.13 CHAPTER SUMMARY

The following points are linked to the chapter's learning objectives:

Using CVP analysis requires simplifying assumptions, including the assumption that costs are either fixed or variable with respect to the number of output units (units produced and sold) and that total revenue and total cost relationships are liner.

CVP analysis assists managers in understanding the behavior of total costs total revenues, and operating income as changes occur in the output level, selling price, variable costs, or fixed costs.

The three methods outlined for computing the breakeven point (the quantity of output where total revenues equal costs) and the quantity of output to achieve target operating income are the equation method, the contribution margin method, and the graph method. Each method is merely a restatement of the other. Managers often select the method they find easiest to use in their specific situation.

Income taxes can be incorporated into CVP analysis by using target net income rather than target operating income. The breakeven point is unaffected by the presence of income taxes because no income taxes are paid if there is no operating come.

When making decisions, managers use CVP analysis to compare contribution margins and fixed costs the different alternatives. Sensitivity analysis, a "what-if" technique, systematically examiners how a result will change if the original predicated data are not achieved or if an underlying assumption changes.

CVP analysis highlights the downside risk and upside return of alternatives that differ in the structure of their fixed costs & variable costs.

When CVP analysis is applied to a multiple-product company it is assumed that there is a constant sales mix of products as the total quantity of units sold changes.

Contribution margin is revenues minus all variable costs (throughout the value chain), while gross margin is revenues minus cost of goods sold.

The basic concepts of CVP analysis can be adapted to multiple cost driver situations but the simple formulae of the single cost driver case can no longer be used.

1.14 SELF TEST EXERCISE

PART I: TRUE /FALSE/

Instruction: dear learners, please Write "True" if the statement is correct and "False" if the statement is incorrect.

1. In financial accounting, the term expense relates to expenditure and when this expense expires it will be reported on an income statement as cost.
2. The difference between total revenues and total variable costs is called gross margin.

3. Service-sector companies can compute a contribution margin figure but not a gross margin figure
4. Variable non-manufacturing costs are deducted from revenues when computing gross margin but are not deducted when computing contribution margin.
5. Income taxes can be incorporated into CVP analysis by using target net income rather than target operating income
6. The breakeven point is unaffected by the presence of income taxes because no income taxes are paid if there is no operating come.
7. Always, qualitative factors dictate management's make-or buy decision.
8. When CVP analysis is applied to a multiple-product company it is assumed that there is a constant sales mix of products as the total quantity of units sold changes.
9. Like contribution margin, gross margin can be expressed as a total, as an amount per unit, or as a percentage.
10. Fixed manufacturing costs are deducted from revenues when computing contribution margin but are not deducted when computing gross margin.

PART II: Multiple Choices

Select the best answer for each of the following multiple – choice questions:

1. CVP analysis requires costs to be categorized as
   A. Either fixed or variable.
   B. Direct or indirect.
   C. Product or period.
   . D. Standard or actual.
2. With respect to fixed costs, CVP analysis assumes total fixed costs
   A. Per unit remain constant as volume changes.
   B. Remain constant from one period to the next.
   . C. Vary directly with volume.
   D. Remain constant across changes in volume.

3. CVP analysis relies on the assumptions that costs are either strictly fixed or strictly variable. Consistent with these assumptions, as volume decreases total

A. Fixed costs decrease.

B. Variable costs remain constant.

C. Costs decrease.

. D. Costs remain constant.

4. Cost-volume-profit analysis is a technique available to management to understand better the interrelationships of several factors that affect a firm's profit. As with many such techniques, the accountant oversimplifies the real world by making assumptions. Which of the following is not a major assumption underlying CVP analysis?

   A. All costs incurred by a firm can be separated into their fixed and variable components.

   B. The product selling price per unit is constant at all volume levels.

   . C. Operating efficiency and employee productivity are constant at all volume levels.

   D. For multi-product situations, the sales mix can vary at all volume levels.

5. After the level of volume exceeds the break-even point

   A. The contribution margin ratio increases.

   B. The total contribution margin exceeds the total fixed costs.

   . C. Total fixed costs per unit will remain constant.

   D. The total contribution margin will turn from negative to positive.

6. At the break-even point, fixed costs are always

   A. Less than the contribution margin.

   B. Equal to the contribution margin.

   C. More than the contribution margin.

   . D. More than the variable cost.

7. The contribution margin ratio always increases when the

   A. Variable costs as a percentage of net sales increase.

   B. Variable costs as a percentage of net sales decrease.

   C. Break-even point increases.

   . D. Break-even point decreases.

8. In a multiple-product firm, the product that has the highest contribution margin per unit will

A. Generate more profit for each $1 of sales than the other products.

B. Have the highest contribution margin ratio.

C. Generate the most profit for each unit sold.

. D. Have the lowest variable costs per unit.

9. On a break-even chart, the break-even point is located at the point where the total

A. Revenue line crosses the total fixed cost line.

B. Revenue line crosses the total contribution margin line.

C. Fixed cost line intersects the total variable cost line.

. D. Revenue line crosses the total cost line.

10. On a break-even chart, the break-even point is located at the point where the total

A. Revenue line crosses the total fixed cost line.

B. Revenue line crosses the total contribution margin line.

. C. Fixed cost line intersects the total variable cost line.

D. Revenue line crosses the total cost line.

11. The margin of safety would be negative if a company('s)

. A. Was presently operating at a volume that is below the break-even point.

B. Present fixed costs were less than its contribution margin.

C. Variable costs exceeded its fixed costs.

D. Degree of operating leverage is greater than 100.

PART III: WORK OUT

Work-out the following questions according to the directions beside each question.

1. Garrett Manufacturing sold 410,000 units of its product for $68 per unit in 2011. Variable cost per unit is $60 and total fixed costs are $1,640,000.

Required:

a. Calculate (a) contribution margin and (b) operating income.

b. Garrett's current manufacturing process is labor intensive. Kate Schoenen, Garrett's production manager, has proposed investing in state-of-the-art manufacturing equipment, which will increase the annual fixed costs to $5,330,000. The variable costs are expected to decrease to $54 per unit. Garrett

expects to maintain the same sales volume and selling price next year. How would acceptance of Schoenen's proposal affect your answers to (a) and (b) in requirement 1?

c. Should Garrett accept Schoenen's proposal? Explain.

2. Sunny Spot Travel Agency specializes in flights between Toronto and Jamaica. It books passengers on Canadian Air. Sunny Spot's fixed costs are $23,500 per month. Canadian Air charges passengers $1,500 per round-trip ticket.

Required:

Calculate the number of tickets Sunny Spot must sell each month to (a) break even and (b) make a target operating income of $17,000 per month in each of the following independent cases.

a) Sunny Spot's variable costs are $43 per ticket. Canadian Air pays Sunny Spot 6% commission on ticket price.
b) Sunny Spot's variable costs are $40 per ticket. Canadian Air pays Sunny Spot 6% commission on ticket price.
c) Sunny Spot's variable costs are $40 per ticket. Canadian Air pays $60 fixed commission per ticket to Sunny Spot. Comment on the results.
d) Sunny Spot's variable costs are $40 per ticket. It receives $60 commission per ticket from Canadian Air. It charges its customers a delivery fee of $5 per ticket. Comment on the results.

3. The Super Donut owns and operates six Donut outlets in and around Kansas City. You are given the following corporate budget data for next year:

Revenues	$10,000,000
Fixed Cost	1,800,000
Variable Cost	8,000,000

Variable costs change with respect to the number of Donuts sold.

Required

Compute the budgeted Operating Profit for each of the following deviation from the original budget data. (Consider each case independently.)

a) A 10% increase in contribution margin, holding revenue constant.
b) A 10% decrease in contribution margin, holding revenue constant.
c) A 5% increase in fixed costs
d) A 5% decrease in fixed costs
e) An 8% increase in unit sold
f) An 8% decrease in unit sold
g) A 10% increase in fixed costs and 10% increase in units sold
h) A 5% increase fixed costs in and 5% decrease in variable costs

Chapter: 2 MASTER BUDGET AND RESPONSIBILITY ACCOUNTING

Learning Objectives:

After studying this chapter, you should be able to:

- Define master budget and explain its major benefits to an organization
- Explain relations ships among components of master budget
- Describe key advantages of budgets
- Prepare the operating budget and its supporting schedules
- Describe responsibility centers and responsibility accounting
- Explain how controllability relates to responsibility accounting

2.1 Introduction

Hello Dear learners! In this chapter you will learn about master budget & responsibility accounting. Budgeting at airline assembly companies is enhanced by coordinating with companies such as Singapore airline and united Airlines about the timing, number and type of future aircraft purchases.

Budgeting is the most widely used accounting tool for planning and controlling organizations. Budgeting systems turn managers' perspectives forward. By looking to the future and planning, managers are able to anticipate and correct potential problems before they arise. Managers can then focus on exploiting opportunities instead of fighting fires. *As one observer said: "Few businesses plan to fail, but many of those that flop failed to plan."*

Budgets can financially reflect many of the evolving cost accounting and management themes described in Cost and Management Accounting I. For example, budgets can quantify the planned financial effects of activities aimed at continuous improvement and cost reduction. Understanding cost behavior allows managers to better predict how different projected output levels affect total budgeted costs. Also, understanding cost tracing and cost allows managers to show how different projected revenue and cost amounts will affect the budgeted income

statement and budgeted balance sheet. We now discuss the major features of budgets and their role in planning.

2.2 Budgets and the Budgeting Cycle

A budget is the quantitative expression of a proposed plan of action by management for a future time period and is an aid to the coordination and implementation of the plan. A budget can cover both financial and non financial aspects of these plans and acts as a blueprint for the organization to follow in the upcoming period. Budgets covering financial aspects quantify management's expectations regarding future income, cash flows, and financial position. Just as individual financial statements are prepared covering past periods, so they can be prepared covering future periods for example, a budgeted income statement, a budgeted statement of cash flows, and a budgeted balance sheet. Underlying these financial budgets can be non financial budgets for, say, units manufactured or sold, head count, and number of new products being introduced to the market.

Well-managed organizations usually have the following budgeting cycle:

1. Planning the performance of the organization as a whole as well as its subunits. The entire management team agrees as to 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, considering feedback and changed conditions.

☞ Quick Check exercise

What are the four elements of the budgeting cycle?

2.3 The Master Budget: An Overall Plan

The master budget is a summary of all phases of a company's plans and goals for the future. It is a set of budgets prepared collectively for all activities of a company. Different companies may prepare different individual budgets. But all firms do have their own master budget. The master budget is a net work consisting of many separate budgets which are interdependent.

The master budget 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 embraces the impact of both operating decisions and financing decisions. Operating decisions center on the use of scarce resources. Financing decisions center on how to obtain the funds to acquire those resources. The focus of this chapter is on how accounting helps

managers make operating decisions. Therefore, this chapter emphasizes operating budgets. Operating managers spend a significant part of their time in budget preparation or analysis. The many advantages of budgeting make this a very wise investment of their energy.

Terminology used to describe budgets varies among organizations. For example, budgeted financial statements are sometimes called pro forma statements. The budgeted financial statements of many companies include the budgeted income statement, the budgeted balance sheet, and the budgeted statement of cash flows.

Quick Check exercise

Define master budget.

2.4 Time Frames of Budgets

Budgets are prepared with some time frame. The time frame varies depending on the, type of budgets to be prepared. Generally, budgets can be grouped into two depending upon the longevity of time they cover. These are:

- Short-term budgets, and
- Long-term budgets

Short-term budget are prepared to formally express the short-term plans in quantitative terms. Usually a year is considered as a short-term plan period. Depending upon the seasonal patterns of business a firm might develop budgets quarterly, monthly, or even weekly for some important factors. For example, a firm may develop a monthly cash flow budgets. A typical short-term budget covering one year period would be divided into quarters. The first quarter budget would then be divided into monthly budgets. Then, towards- the end of the succeeding quarter, the next quarter budget will be divided into monthly segments. Postponing the division of quarter's budgets into month's leads to more accurate results because more recent data are available by the time the monthly figures are prepared.

Another method to prepare a short-term budget is to add a month when one month covered by the budget ends: Such type of budget is called continuous budget. Each month, the managers add an additional month to the budget thus keeping a twelve month budget always available. For example, a firm may prepare a budget for a year covering a year (from Hamle to Sene).

In continuous budgeting, this firm will add the budget for the coming Hamle by the end of the current Hamle, by the end of Nehassie the one month budget would be added (next year‟s Nehassie) and so on. Continuous budgeting keeps the firm‟s plan ahead and the‟ firm will have 12 months budget at any time. If the firm prepares only annual budgets, the firm will have guidance only for 12 months at the beginning and a month or two as it approaches the end of the

budget period. The budgeting process involves a great deal of work and the use of continuous budgeting spreads it throughout the year instead of concentrating it near the end of each year.

Long-term budgets are prepared to quantify formally the long-term planning, also called strategic planning which is a process of setting long-term goals and determining the means to achieve them. Short-term planning is concerned with the operating details of the next fiscal period or year but long-term planning addresses broader issues such as developing new product line, replacement of plants and equipment, and other issues which require years of advance planning. Long-term budgets, therefore, could have a time frame of 5 year s to 10 years even more range. A capital budget is an important part of long-term planning. Some budgets are oriented not to specific time period but to events. These are typical project budgets. However, project budgets‟ usually cover more than one year period and are long-term budgets.

2.5 Budget Classification

Budgets are sometimes called Proforma statements because they are forecasted financial statements in contrast to statement's prepared using actual data.

The master budget can be classified as operational budgets and financial budget Operational budgets focus on the operational activities of the firm and financial budget focuses on the effect that operational budgets and other plans such as capital expenditures and repayment of debt will have on cash.

Operating budget is accompanied by the following schedules.

1. Sales budget: prepared perhaps by product territory, customer groups, or other segment of interest.
2. Production budget: prepared by product or by plant
3. Purchases budget: prepared for each type of raw materials for manufacturing firms, or for each type of goods purchased (merchandises) for merchandising firms.
4. Labor budget: Prepared by the type of worker required, in labor hours, or in number of workers.
5. Production cost budget: prepared product, or by plant.
6. Ending inventory budget: prepared for each type of raw materials, and each type of product.
7. Manufacturing overhead budget: prepared by each plant or product.
8. Marketing & other costs budget: prepared by categories depending on the relative importance of various types of expenses (selling, general, administrative, research and development, and so on)
9. Budgeted income statement.

1. Capital budgets.
2. Cash budgets including receipts and disbursements.
3. Budgeted balance sheet.
4. Budgeted statement of cash flow - budgeted statement of changes in financial position (source and application of funds)

2.6 Advantages of Budgets

Budgets are a major feature of most management control systems. 'When administered wisely, budgets (a) compel planning including the implementation of plans, (b) provide performance criteria, and (c) promote coordination and communication within the organization. However, budgets must be carefully and intelligently administered by management.

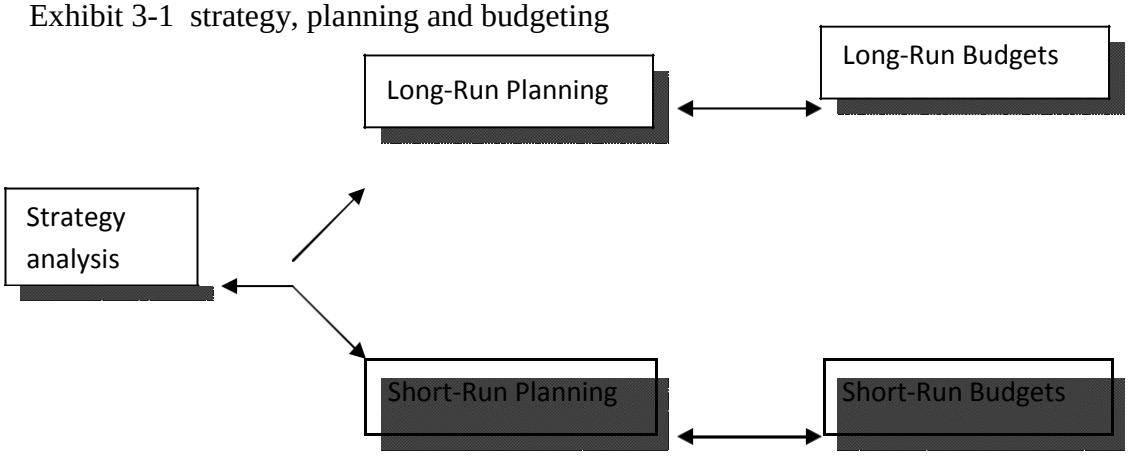
A. Strategy and Plans

Budgeting is most useful when done as an integral part of an organization's strategy analysis. Strategy describes how an organization matches its own capabilities with the opportunities in the marketplace to accomplish its overall objectives. It includes consideration of such questions as:

A. 'What are the overall objectives of the organization?
B. Are the markets for its products local, regional, national, or global? What trends affect its markets? How is the organization affected by the economy, its industry and its competitors?
C. What forms of organization and financial structures serve the organization best?
D. What are the risks of alternative strategies, and what are the organization's contingency plans if its preferred plan fails?

As shown in Exhibit 3-1, strategy analysis underlies both lung-run and short- run planning. In turn, these plans lead to the formulation of budgets. Note the arrowheads in the exhibit are pointing in two directions. Why? Because strategy, plans, and budgets are interrelated and affect one another. Budgets provide feedback to managers about the likely effects of their strategic plans. Managers then use this feedback to revise their strategic plans.

Exhibit 3-1 strategy, planning and budgeting



Quick Check exercise

"Strategy, plans and budgets are unrelated to one another." Do you agree? Explain.

B. Framework for Judging Performance

Once plans are in place, budgets are also extremely effective as performance measures. Budgeted performance measures can overcome 'two key limitations of using past performance as a basis for judging actual results. One limitation is that past results incorporate past miscues and substandard performance. Consider a cellular telephone company (Mobile Communications) examining the year 2001 performance of its sales force. Suppose the past performance in 2000 incorporates the efforts of many salespeople who left because they did not have a good understanding of the marketplace. (As the president of Mobile said, "They could not sell ice cream in a heat wave.") Using the sales record of those departed employees would set the performance bar for new salespeople much too low.

A second limitation of past performance is that the future may be expected to be very different from the past. Consider again our cellular telephone company. Suppose Mobile Communications in 2001 had a 20% revenue increase compared to a 10% revenue increase in 2000. Does this increase indicate stellar sales performance? Before saying yes, consider two additional facts. First, in November 2000 an industry trade association forecast that the 2001 growth rate in industry revenues: would be 40 percent. Second, in 2001 the actual growth rate in industry revenues was 50 percent. Mobile's 20% actual revenue gain in 2001 takes on a negative connotation given these two facts, even though it exceeds the 2000 actual growth rate of 10 percent. Use of the 40% figure as the budgeted rate provides a better way to evaluate the 2001 sales performance than the use of the 2000 actual rate of 10 percent.

☞ Quick Check exercise

"Budgeted performance is a better criterion than past performance for judging managers." Do you agree? Explain.

C. Coordination and Communication

Coordination is the meshing and balancing of all factors of production or service and of all the departments and business functions so that the company can meet its objectives. Communication

is getting those objectives understood and accepted by all the employees in the various departments and functions.

Coordination forces executives to think of relationships among individual operations, departments, the company as a whole, and across companies. Consider budgeting at Pace, a United Kingdom—based manufacturer of electronic products. A key product is their decoder boxes for cable television. The Pace production manager for decoder boxes can better budget production schedules by coordinating and communicating with the marketing personnel at Pace. These marketing personnel, in turn, can make better predictions as to future demand for decoder boxes by coordinating and communicating with Pace's customers. Suppose BSKYB, one of Pace's largest customers, is planning to launch a new digital satellite service nine months from now. If Pace's marketing group is able to obtain advance information about the launch date for the digital satellite service, it can share this information with Pace's manufacturing group. This group must then coordinate and communicate with Pace's materials procurement group, and so on. The key point is that Pace is more likely to have a satisfied customer (decoder boxes available for BSKYB in sufficient quantities at the launch date) if Pace coordinates and communicates both within its own business functions and with its suppliers and customers during the budgeting process as well as during the production process.

D. Management Support and Administration

Budgets help managers, but budgets need help. Top management has the ultimate responsibility for budgets of the organization they manage. Management at all levels, bow ever should understand and support the budget and all aspects of the management control system. Top management support is especially critical for obtaining active line- management participation in the formulation of budgets and for successful administration of the budget. If line managers feel that top management does not "believe" in the budget, these managers are unlikely to be active

participants in the budget process. Similarly, a top management that always mechanically institutes "across the board" cost reductions (say, a 10% reduction in all areas) in the face of projected revenue reductions is unlikely to have line managers willing to be "fully honest" in their budget communications.

Budgets should not be administered rigidly. Changing conditions call for changes in plans. A manager may commit to the budget, but a situation might develop in which some unplanned repairs or an unplanned advertising program better serve the interest of the organization. The manager should not defer the repairs or the advertising in order to meet the budget if such actions will hurt the organization in the long run. Attaining the budget should not be an end in itself.

Top managers face the challenge of providing managers at all levels in the organization with incentives to make budget communications truthful and complete. It is unwise to assume that managers will always have adequate incentives or motivation in this regard. One proposed approach is to reward managers based on the subsequent accuracy of their forecasts used in budgets. The more accurate their budget forecasts, the higher their incentive bonuses.

2.7 Limitations and Problems

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. Uncertainty affects both sides of the financial performance dichotomy, but uncertainty on the revenue side presents a more serious limitation for planning. The sales budget is frequently based on a forecast supported by a variety of assumptions about the economy, the actions of the Federal Reserve board and congress in implementing monetary and fiscal policy, and the actions of competitors, suppliers, and customers. The uncertainty associated with sales forecasting creates a greater problem than uncertainty on the cost side because the other parts of the budget are derived from the sales forecast. This forces management to constantly monitor and analyze changes in the economic environment. From the planning perspective, the inability to accurately forecast the future reduces the usefulness of the original budget estimates for materials requirements planning (MRP) and planning for other resource

needs. Uncertainty on the cost side tends to be less of a problem because management has more influence over the quantities of resources consumed than over the quantities of their own products purchased by customers. From a performance evaluation and control perspective, uncertainty on both sides of the financial performance dichotomy is not as much of a problem because flexible budgets are used to fine tune the original budget to reflect expectations at the current level of activity.

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 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. Of course this process must be coordinated by a budget director to ensure that a fair budget is obtained that will help achieve the goals of the total organization.

Another way to reduce the behavioral bias against budgeting is to recognize the concepts of variation and interdependence when using the budget to evaluate performance. Failure to adequately recognize the interdependencies within an organization tends to cause behavioral conflicts and motivate participants to optimize the performance of the various segments (subsystems) rather than to optimize the performance of the overall system. Finally, the behavioral conflicts associated with budgeting are reduced by using flexible budgets when evaluating performance.

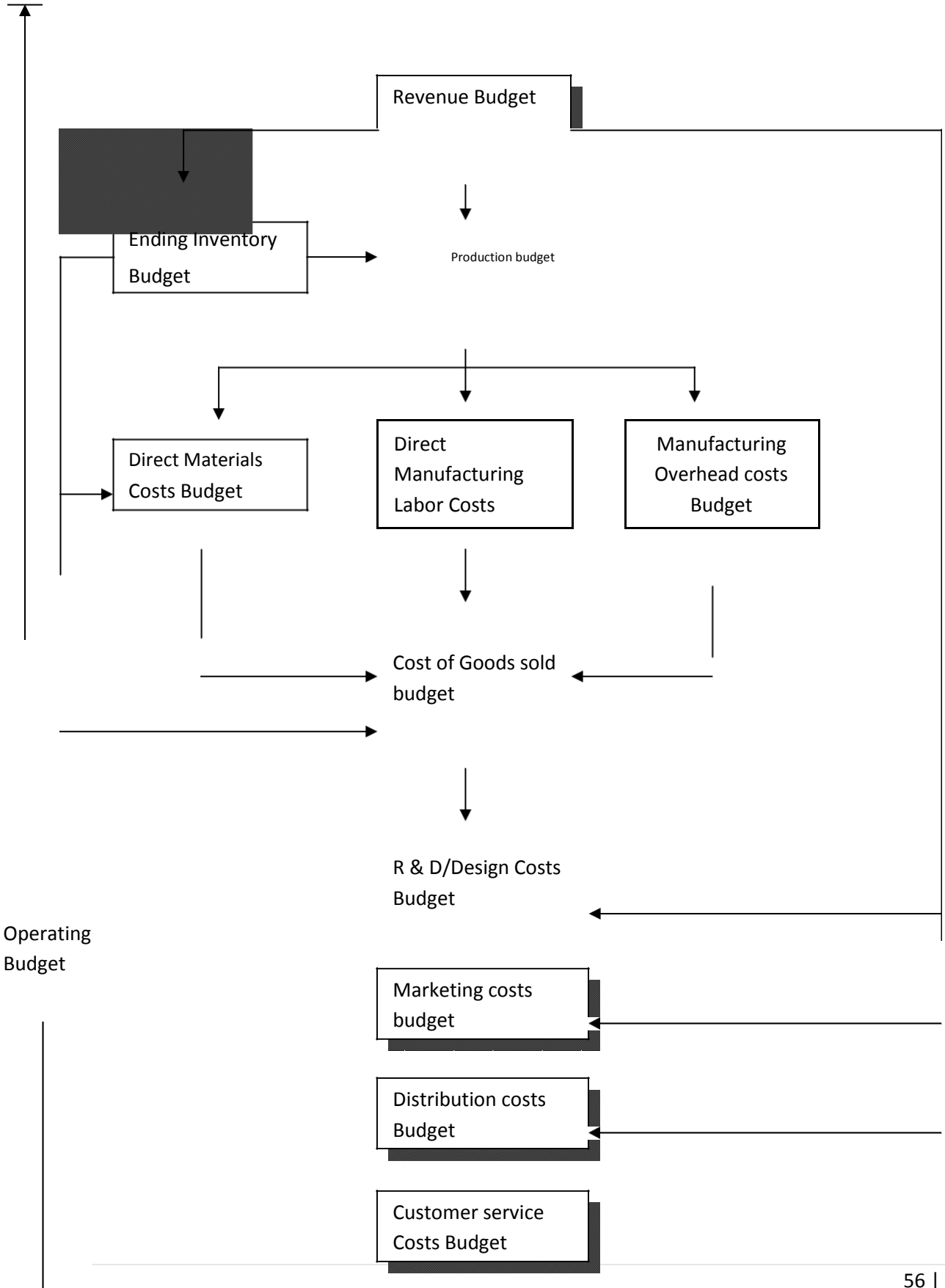
Costs

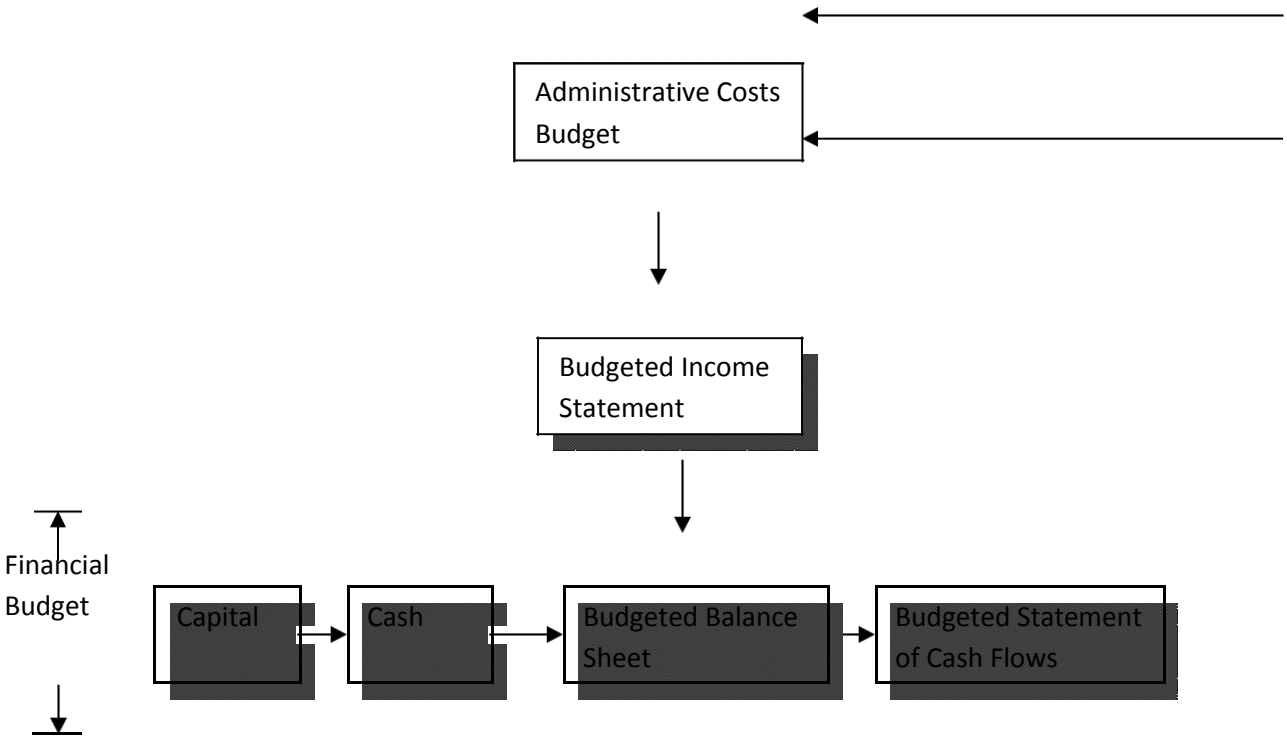
A third problem or limitation is that budgeting requires a considerable amount of time and effort. Many companies maintain a twelve month budget on a continuous basis by adding a future month as the current month expires. While this does not create a major expenditure for large or medium sized organizations, 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.

2.8 Relationship among Budgets

The sub units of the master budget are interdependent. For example, the sales forecast could be influenced by the amount that the firm is willing to spend on advertising and sales promotion. In turn these expenditures are dependent on the sales forecast. The interrelationships are very complex. For example, production managers develop production budgets from sales budgets and might find that they could not produce be required level of output because of shortages of inputs labor, material, or other inputs. The process would then have to be started again and firms migh the obliged to change their strategies regarding a particular product. The change in policy could be to raise prices or lower promotional expenses.

There could be similar to-and-from movements between sales budgets and credit policy) and virtually all other budgets and policies. For example, changing credit terms from a 60 day to 30 day payment in an effort to collect cash rapidly could adversely affect sales and profits, as could reducing the quantity of inventory of finished goods to save interest expense. The following, chart demonstrates the relationship among budgets.


Revenue Budget
Ending Inventory Budget
Production budget
Direct Materials Costs Budget
Direct Manufacturing Labor Costs
Manufacturing Overhead costs Budget
Cost of Goods sold budget
R & D/Design Costs Budget
Operating Budget
Marketing costs budget
Distribution costs Budget
Customer service Costs Budget



2.9 Developing the Master Budget

Once the sales budget and the relationships among sales and the other critical variables are known or assumed, the actual development of the master budget is primarily a technical analysis. The mechanics can be done using computer or on a-manual basis. The method used does not lead to correct or wrong budget figures. Using computers, for computation does not guarantee the correctness of budgets. What is critical is whether the assumed relationship actually prevails among budget items. There are two basic errors which may lead to a wrong budget figures. These are: first, the formulation of the budget could be logically wrong. For example, the person setting up the relationship between cash collections and credit sales as "cash collections from credit sales will be 40 percent in the month of sales and 70 percent in the month following the sales," is logically wrong because this statement means that the company would collect 110 percent of its sales (40% + 70% =110%) which is impossible. Second the formulation of the budget could be logically correct, but the relationship could be miss-stated. For example, a person may state that credit sales are collected in the month following the sales were actually credit customers pay their debt on or after 60 days credit period. Moreover, relationships could be stated correctly, formulation of the budget could be logically correct but things may not materialize as budgeted. For example, customer might take longer period than expected to pay

their bills; costs might be higher or lower than budget and so on. However, such types of deviations are tolerable and are tolerable and are considered as an input to modify or improve budgets. Dear learners! In the following sections, each element of the master budget will be discussed item by item.

2.9.1 Operating Budget

The operating budget focuses on the income statement and its supporting schedules. Although the operating budget is sometimes called the profit plan, an operating budget may show a budgeted loss, or even be used to budget expenses in an organization or agency with no sales revenue. The budgeting process normally begins with the preparation of the operating budgets. An operating budget is prepared by individual sections within a company and becomes part of the company's master budget. The number of operating budgets depends on the nature of the business entity. For instance, some operating budgets prepared for manufacturing companies may not be required for merchandising concerns.

STEPS IN DEVELOPING AN OPERATING BUDGET

1. Sales Budget

The sales budget is the starting point for budgeting because the inventory levels, purchases, and operating expenses are geared to the rate of sales activities and other cost drivers. A sales budget is a detailed schedule showing the expected sales for the budget period. The sales budget typically is expressed in both sales birr and units of product. An accurate sales budget is the key to the entire budgeting process. All of the other parts of the master budget are dependent on the sales budget in some way. Thus, if the sales budget is done sloppily or messily, then the rest of the budgeting process is largely a waste of time. The sales budget for a hypothetical company used in this Duty called ABC Company appears in table below shows the total budgeted sales and the composition of cash and credit sales respectively.

It is a forecast of total sales expressed in terms of quantity and or money. It is inevitably the interplay between two factors i.e. sales quantity and selling price. Sales quantity may be forecasted after taking into consideration various factors.

1. Analysis of Past Trend: Analysis of the past trend over the last 5-10 years may reveal the long term trends, seasonal trends and the cyclical trends. With the help of this trend analysis, the future trend can be established. For this purpose, reference can be made to the reports published by trade organizations and Government publications.
2. Reports by Salesmen: Being in the actual field, probably the sales staff may be best able to estimate the quantity which can be sold in the market. Before using this estimate as an official sale forecast, necessary adjustments may be made for error of judgment or to avoid the possibility of overestimation on the part of the salesmen.
3. Market Research and Market Survey: This is a very specialized technique available to assess which of the company's products can be sold, in which market, in what quantity and at what selling price. Such an analysis will facilitate the preparation of sales forecast area wise, product wise, salesmen wise and channel of distribution wise.

4. General Economic Conditions: General trade and business conditions affect the sales forecast of the company. They may be in the form of competition from other companies, supply condition for material and labour, trade conditions of the customers of the company and so on.

ABC Company

Sales Budget

For the Quarter Ended December 31, 20XX

	Months			Quarters
	January	February	March	
Budgeted cash sales	Birr XX	Birr XX	Birr XX	XXXX
Budgeted credit sales	Birr XX	Birr XX	Birr XX	Birr X
Total Budgeted sales	Birr XXXX	Birr XXXX	Birr XXXX	Birr XXXX

Notice that, to prepare the sales budget, budgeted cash sales and budgeted credit sales information of the original data are used and that this information can be obtained from the marketing department or any other sales forecast related units.

☞ Quick Check exercise

2. Cash Collection Budget

"The sales forecast is the cornerstone for budgeting." Why?

3. Cash Collection Budget

The schedule of expected cash collection is prepared at the same time of preparing the sales budget. Thus, after the sales budget is prepared, the schedule of expected cash collections is prepared to show how much cash is expected to be received from customers. The cash collections include to current month's cash sales plus the previous month's credit sales expected to be collected in the current month. In brief, the cash collections consist of collections on sales made to customers in prior periods plus collections on sales made in the current budget period. To prepare this schedule, you have to look at the sales budget prepared above and the data given

in the illustration on the mode of collecting credit sale. The schedule of expected cash collections for ABC Company appears in table below, which will be later needed to prepare the cash budget.

ABC Company

Cash Collection Budget

For the Quarter Ended December 31, 20XX

	Months			Quarters
	January	February	March	
Accounts Receivable-beginning balance	Birr XX	-	-	Birr XX
January sales	Birr XX	Birr XX	-	Birr XX
February sales	-	Birr XX	Birr XX	Birr XX
March sales	-	-	Birr XX	Birr XX
Total expected cash collections	Birr XXX	Birr XXX	Birr XXX	Birr XXX

Sales Forecasting

It has been said earlier that the sales budget is the starting point in preparing the master budget. All other items in the master budget, consequently, depend on the sales budget in some way. Preparing inventory purchases budget, operating expenses budget, and the like would simply mean wastage of time and a futile or useless exercise if a sales budget is not first prepared carefully and accurately. The preparation of the master budget, therefore, calls for the accuracy of the sales forecast. The accuracy of the sales forecast is critical because it acts as the data source for all of the other budgets.

Companies make all effort to obtain reliable estimates of projected sales as they know that unreliable sales figures could destroy the whole purpose of the budgeting process. All companies have two things in common when it comes to forecasting sales of services or goods. First, sales forecasting is a critical step in the budgeting process. Second, it is very difficult to do sales

forecasting accurately. Various procedures are used in sales forecasting, and the final forecast usually combines information from many different sources. Many firms have a top-management-level market research staff whose job is to coordinate the company's sales forecasting efforts. Typically, everyone from key executives to the firm's sales personnel will be asked to contribute sales projections. Major factors considered when forecasting sales include the following:

1. Past sales levels and trends of the firm developing the forecast, and the entire industry which the firm belongs to. Past experience combined with detailed past sales by product line, geographical region, and type of customer can help predict future sales. Projects made by a company's sales force, among other information sources, are typically crucial. This is so because a company's sales personnel are often the best source of information about the desires and plans of customers.
2. General economic trends such as: growth of the economy and its pace, or expected recession or economic slowdown. Prediction of such economic indicators as gross domestic product and industrial production indexes (local and foreign), which are published regularly, is critical to sales forecasting. That is to say that knowledge of how sales relate to these indicators can aid sales forecasting.
3. Economic trends in the company's industry such as: increased customers demand for products or services due to, among others, increased customers' income and decreased customers demand for products or services due to changes in customers' test.
4. Other seasonal factors expected to affect sales in the industry.
5. Political and legal events surrounding the economy.
6. The intended pricing policy of the company. Sales can be increased by decreasing prices and vice versa. Planned changes in prices should consider effects on customer demand.
7. Planned advertising and product promotion. Advertising and other promotional costs affect sales level. A sales forecast should be based on anticipated effects of promotional activities.
8. Expected actions of competitors. Sales depend on the strength and action of competitors. To forecast sales, a company should consider the likely strategies and reactions of competitors, such as changes in their prices, products, or services.
9. New products contemplated by the company or other firms.

10. Changes in product mix. Changing the mix of products often can affect not only sales levels but also overall contribution margin. Identifying the most profitable products and devising methods to increase their sales is a key part of successful management.
11. Market research studies. Some companies hire market experts to gather information about market conditions and customer preferences. Such information is useful to managers making sales forecasts and product mix decisions.

☞ Quick Check exercise

"Cash budgets must be prepared before the operating income budget." Do you agree? Explain.

4. Purchases Budget

This budget is prepared to show the amount of goods to be purchased from suppliers during the period. Merchandising firms would prepare an inventory purchases budget for each item carried in stock. Some large retail organizations make such computations on a frequent basis to ensure that adequate stocks are on hand to meet customer needs. In brief, after the sales budget is prepared, the inventory purchases budget is prepared to show the amount of inventory that will be needed to satisfy the amount of projected sales. Meeting the sales demand requires having enough inventories to cover expected sales and future sales between reorder points. Accordingly, the total amount of inventory needed for each month equals the amount needed to fulfill budgeted sales demand plus the desired ending inventory. The total amount of inventory needed can be obtained from two sources. These are the company can use existing stock, or simply beginning inventory, and the company's planned purchases. The schedule of inventory purchases for ABC Company appears in table below.

ABC Company

Inventory Purchases Budget

For the Quarter Ended December 31, 20XX

	Months			Quarters
	January	February	March	
Budgeted costs of goods sold	Birr XX	Birr XX	Birr XX	Birr XX
Add: Desired ending inventory	Birr XX	Birr XX	Birr XX	Birr XX
Total inventory needed	Birr XX	[redacted]X	[redacted]X	[redacted]X
Less: Beginning inventory	Birr XX	Birr XX	Birr XX	Birr XX
Required purchases	Birr XXXX	Birr XXXX	Birr XXXX	Birr XXXX

5. Disbursement for Purchase Budget

This schedule is based on the purchases budget. This schedule is later needed to prepare the overall cash budget. Disbursements for inventory purchases consist of payments for purchases on account made in prior periods plus any payment for inventory purchases made in the current budget period. The schedule of expected disbursements for purchases for ABC Company appears in table below.

ABC Company

Expected Cash Disbursements for Purchases Budget

For the Quarter Ended December 31, 20XX

	Months			Quarters
	January	February	March	
Accounts payable-beginning balance	Birr XX	-	-	Birr XX
January purchases	Birr XX	Birr XX	-	Birr XX
February purchases	-	Birr XX	Birr XX	Birr XX

March purchases	-	-	Birr XX	Birr XX
Total disbursements for purchases	Birr XXXX	Birr XXXX	Birr XXXX	Birr XXXX

6. Operating Expenses Budget

This budget lists the budgeted operating expenses for the budget period. All budgeted selling and administrative expenses would be compiled and listed down. In large organizations, this budget would be a compilation of many smaller, individual budgets submitted by department heads and other persons responsible for selling and administrative expenses. For example, the marketing manager in a large organization would submit a budget detailing the advertising expenses for each budget period.

The budgeting of operating expenses depends on various factors. Month-to-month fluctuations in sales volume and other cost-driver activities directly influence many operating expenses. Examples of expenses driven by sales volume include sales commissions and many delivery expenses. Other expenses are not influenced by sales or other cost-driver activity, and such expenses include rent, insurance, depreciation, and salaries within appropriate relevant ranges and are regarded as fixed. The operating expenses budget does not contain a provision for interest expense, because the amount of interest expense cannot be determined until the amount of expected borrowing has been established through the preparation of the cash budget. Accordingly, the interest component will be determined at a later point in the budgeting process. The operating expense budget, in any case, will be later needed to prepare the budgeted income statement. The schedule of operating expense budget for ABC Company appears in table below.

ABC Company

Operating Expense Budget

For the Quarter Ended December 31, 20XX

	Months			Quarters
	January	February	March	

Salaries and wages	Birr XX	Birr XX	Birr XX	Birr XX
Advertising	Birr XX	Birr XX	Birr XX	Birr XX
Shipping	Birr XX	Birr XX	Birr XX	Birr XX
Depreciation	Birr XX	Birr XX	Birr XX	Birr XX
Other expenses	Birr XX	Birr XX	Birr XX	Birr XX
Total budgeted operating expenses	Birr XXXX	Birr XXXX	Birr XXXX	Birr XXXX

7. Disbursements for Operating Expenses Budget

This schedule is based on the operating expenses budget. For example, if the information available states that cash expenses are paid as incurred it means that all cash expenses incurred in first month will be paid in that month, and so on. In practice, differences between expense recognition and cash flow are present because of several conditions. Thus, expenses recognized in one period may not affect the cash flow of that period if they will be paid in later periods. Notice that depreciation expense is not included in the cash disbursements for operating expenses, because depreciation is a non-cash expense. Cash outflow for investments in plant assets is shown as an investing activity at the time cash is paid to purchase plant assets. At this time, the investing activity will be shown on a separate line on the cash budget. At later times, depreciation is recognized as an expense by rationally and systematically allocating the cost of plant assets over their useful life. Such an allocation, however, does not represent an expense that calls for the payment of cash. The schedule of expected cash disbursements for operating expenses for ABC Company appears in table below.

ABC Company

Cash Disbursements for Operating Expense Budget

For the Quarter Ended December 31, 20XX

	Months			
	January	February	March	Quarters
Salaries and wages	Birr XX	Birr XX	Birr XX	Birr XX
Advertising	Birr XX	Birr XX	Birr XX	Birr XX
Shipping	Birr XX	Birr XX	Birr XX	Birr XX
Other expenses	Birr XX	Birr XX	Birr XX	Birr XX
Disbursements for operating expenses	Birr XXXX	Birr XXXX	Birr XXXX	Birr XXXX

Notice from the operating expense disbursement schedule that depreciation expense is excluded for reasons explained earlier. This schedule will later be needed when the cash budget is prepared.

8. Budgeted Income Statement

The budgeted income statement from operations can be prepared from the data developed in all tables shown above. The budgeted income statement is one of the key schedules in the budget process. It shows the company's planned profit for the upcoming budget period, and it stands as a benchmark against which subsequent company performance can be measured. The income statement will be complete after addition of the interest expense, which is computed after the cash budget, has been prepared.

If expected profitability is unsatisfactory, management may take actions, including abandoning the project for which the budget is prepared or altering planned activity. Management perhaps may convince employees to accept lower pay or take actions to reduce the number of employees, which is of course is not a corrective action. Likewise, the pricing strategy could be scrutinized or examined for possible changes. Indeed, budgets are usually prepared on spreadsheets or computerized mathematical models that enable managers to easily perform "what-if" analysis. Managers change some variables on the spreadsheet, and the software instantly presents revised

set of budgets. Although computer technology can provide instant access to a wide array of budgeted data, the manager remains responsible for data analysis and decision-making. The proper interpretation of budgeted data requires an understanding of the origins and limitations of the budget amounts. For this reason, you are advised to retrace the data in the budgeted income statement, and other Performa financial statements for that matter, back to the source data.

The budgeted income statement for ABC Company appears in table below, which is referenced by the source data for its preparation. Notice that income taxes are ignored in this illustration.

ABC Company

Budgeted Income Statement

For the Quarter Ended December 31, 20XX

Sales		Birr XX
Less cost of goods sold		Birr XX
Gross margin		Birr XX
Less operating expenses:		
Salaries and wages	Birr XX	
Advertising	Birr XX	
Shipping	Birr XX	
Depreciation	Birr XX	
Other expenses	Birr XX	
Total operating expenses		Birr XX
Net operating income		Birr XX
Less interest expense		Birr XX
Net income		Birr XX

The interest expense will be computed later when the cash budget is prepared. The main reason why the budgeted income statement is prepared before the cash budget is to show that the ultimate output of the operating budgets is Performa or budgeted income statement.

☞ Quick Check exercise

Outline the steps in preparing an operating budget.

2.9.2 Financial Budget

The second major part of the master budget is the financial budget, which consists of the capital budget, cash budget, budgeted balance sheet, & budgeted statement of cash flows. The capital expenditure budget or capital budget is a very important budget as it throws light on a firm's outlay and expansion and diversification program. This budget may not be restricted to a single year and may be prepared to cover a long period of years. While preparing this budget, factors such as sales potential for the increased production, possibility of price reduction, and increased selling and administrative costs are to be considered. The capital expenditure budget enables a firm to establish a system of priorities, and serves as a tool for controlling expenditure. It also facilitates cost reduction program particularly when modernization and renovation is covered by this budget. However, the capital expenditure budget will not be discussed in this section. This section, therefore, focuses on the cash budget, budgeted balance sheet, and budgeted statement of cash flows. The financial budget focuses on the effects that the operating budget and other plans (such as capital budgeting and repayment of debt) will have on cash.

1. Capital Budget

The capital budget is prepared for additions to property and equipment. This budget is used to describe a company's long-term plans regarding investment in facilities, equipment, new products, store outlets, and lines of business.

2. Cash Budget

The cash budget is used, as you shall see later in this section, to ensure that cash will be available throughout the budget year. Once the operating budgets have been established, the cash budget and other financial budgets can be prepared. A cash budget is a detailed plan showing how cash resources will be acquired and used over some specified time period. All of the operating budgets have an impact on the cash budget. In the case of the sales budget, the impact comes from planned cash receipts to be collected from sales to customers. In the case of the other budgets, the impact comes from the planned cash expenditures within the budgets themselves.

The cash budget is a statement of planned cash receipts and disbursements and pulls together much of the data developed in the preceding steps. Most of the raw data needed to prepare the cash budget are included in the cash receipts and disbursements schedules that were discussed earlier. However, further refinements of these data are sometimes necessary. The cash budget is composed of four major sections listed below:

1. The Receipts Section. This section consists of a listing of all of the cash inflows, except for financing, expected during the budget period. Generally, the major source of receipts will be from sales.
2. The Disbursements Section. This section consists of all cash payments that are planned for the budget period. These payments will include raw materials purchases, direct labor payments, manufacturing overhead costs, operating expenses, and so on, as contained in their respective budgets. In addition, other cash disbursements such as equipment purchases, dividends, and other cash withdrawals by owners are listed. This is additional information that does not appear on any of the earlier schedules.
3. The Cash Excess or Deficiency Section. The cash excess or deficiency is computed as follows:

Cash Balance, Beginning	Birr XX
Add Cash Received	Birr XX
Total cash available before financing	Birr XX

Less disbursement	Birr XX
Excess (deficiency) of cash	Birr XX

If there is a cash deficiency during any budget period, the company will need to borrow funds. If there is cash excess during any budget period, funds borrowed in previous periods can be repair or the idle funds can be placed in short-term or other investments.

4. The Financing Section. This section provides a detailed account of the borrowings and repayments projected to take place during the budget period. It also includes a detail of interest payments that will be due on money borrowed.

The following points are worth mentioning about the cash budget shown for ABC Company in table below:

a) Cash balance, beginning. It is taken from the original information given or available, that is, a cash balance on December 31, 20XX in the case of ABC Company. Thus, remember that the ending cash balance of December becomes the beginning cash balance of January. Moreover, the beginning cash balance for the quarter means the same as the beginning cash balance for January. This is so because the quarter begins on January 1.
b) Collections from customers. The collections from customers are brought from the schedule of expected cash collections.
c) Purchases of inventory. The figures for purchases of inventory are taken from the schedule of expected cash disbursements for purchases.
d) Operating expenses. The figures for operating expenses are taken from the schedule of expected cash disbursements for operating expenses.
e) Purchases of equipment and cash dividends. While the figures for purchases of equipment are taken from information given or available and the figure for cash dividends.
f) Financing.

ABC Company

Cash Budget

For the Quarter Ended December 31, 20XX

	Months			Quarters
	January	February	March	
Cash balance, beginning	Birr XX	-	-	Birr XX
Add Cash Received				
Collection from customers	Birr XX	Birr XX	Birr XX	Birr XX
Total cash available [a]	Birr XX	Birr XX	Birr XX	Birr XX
Less disbursements:				
Purchases of inventory	Birr XX	Birr XX	Birr XX	Birr XX
Operating expenses	Birr XX	Birr XX	Birr XX	Birr XX
Purchases of equipment	-	Birr XX	Birr XX	Birr XX
Cash dividends	Birr XX	-	-	Birr XX
Total disbursements [b]	Birr XX	Birr XX	Birr XX	Birr XX
Excess (deficiency) of cash [c] = [a] + [b]	Birr XX	Birr XX	Birr XX	Birr XX
Financing:				
Borrowings (at beginning)	Birr XX	-	-	Birr XX
Repayments (at ending)	-	-	Birr XX	Birr XX
Interest	-	-	Birr XX	Birr XX
Total financing [d]	Birr XX	-	Birr XX	Birr XX

Cash balance, ending [e] = [c] + [d]	Birr XXXX	Birr XXXX	Birr XXXX	Birr XXXX

3. Budgeted Balance Sheet

Financial budgets are concerned with the inflows and outflow of cash, which may be detailed in cash budget and showing expected financial position at the end of the budget period in a proforma or budgeted balance sheet. The preparation of the operating budget should precede the preparation of the financial budget because many of the financing activities are not known until the operating budgets are known.

The budgeted or proforma balance sheet projects each balance sheet item in accordance with the business plan as expressed in the previous schedules. To construct the budgeted balance sheet, we start with the general ledger account balances as of December 31,20XX given or available data in the case of ABC Company and adjust each balance sheet account balance for the changes expected to take place during 20XX. The budgeted balance sheet for ABC Company is shown in table below

ABC Company

Budgeted Balance Sheet

December 31, 20XX

Assets		
Current assets:		
Cash	Birr XX	
Accounts receivable	Birr XX	
Inventory	Birr XX	
Total current assets		Birr XX
Plant assets:		

Building and equipment (net)		Birr XX
Total Assets		Birr XX
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable		Birr XX
Stockholders' equity:		
Capital stock	Birr XX	
Retained earnings	Birr XX	
Total stockholders' equity		Birr XX
Total Liabilities and Stockholders' Equity		Birr XXX

Carefully observe the following explanations about the figures contained in the budgeted balance sheet shown in table above.

a) Cash: The figure for cash is brought from the cash budget prepared before and shows the ending cash balance for the month of March or for the quarter in general.
b) Accounts Receivable: The figure for accounts receivable represents the credit sales expected to be made in March. You are encouraged to look back at the explanation given below the schedule of expected cash collections that appears in schedule.
c) Inventory: The figure for inventory is brought from the inventory purchases budget in schedule 1(c) and shows the desired ending inventory for the month of March or for the quarter in general.
d) Plant assets (net): The figure for plant assets (net) is computed from the acquisition cost of the plant assets and its accumulated depreciation.
e) Accounts payable: The figure for accounts payable represents the amount of the inventory purchases and other items acquired on account in March. You are encouraged

to look back at the explanation given below the schedule of expected cash disbursements for inventory purchases.

f) Capital stock: The figure for capital stock is taken as it is directly from information given on the general ledger account balances as of the date of incorporation and any other paid in capital in excess of par value.

g) Retained earnings: The figure for retained earnings is computed projected retained earnings and adding it to the net income projected and deducting the dividends to paid.

As explained earlier, the master budget is the principal output of a budgeting system that shows a comprehensive operating and financial plans of management. This budget ties together all phases of an organization's operations and is comprised of many separate budgets and schedules that are interdependent. The terms used to describe assorted budget schedules vary from organization to organization, though most master budgets have common elements. The usual master budget for a non-manufacturing company has the following components:

Notice that the number of operating budgets depends on the nature of the business entity: Manufacturing firms, merchandising firms, and service industry firms. In general, based on the sales budget, a company develops a set of budgets that specify how its operations will be carried out to meet the demand for its goods or services. A manufacturing company develops a production budget, which shows the number of product units to be manufactured. Coupled with the production budget are ending inventory budgets for both work-in-process and finished goods. Manufacturers plan to have some inventory on hand at all times to meet peak demand while keeping production at a stable level. From the production budget, a manufacturer develops budgets for direct materials, direct labor, and overhead that will be required in the production process. A budget for selling and administrative expenses is also prepared.

The operational portion of the master budget is similar in a merchandising firm, but instead of a production budget for goods, a merchandiser develops a budget for merchandise purchases. A merchandising firm will not have a budget for direct materials, because it does not engage in production. However, the merchandiser will develop budgets for labor (or personnel), overhead,

and selling and administrative expenses. Based on the sales budget for its services, a service industry firm develops a set of budgets that show how the demand for those services will be meet. An airline, for example, prepares the following operational budgets: a budget of planned air miles to be flown, material budgets for spare aircraft parts, aircraft fuel, and in-flight food, labor budgets for flight crews and maintenance personnel, and an overhead budget.

Operational budgets differ since they are adapted to the operations of individual companies in various industries. However, operational budgets are also similar in important ways. In each firm they encompass a detailed plan for using the basic factors of production-material, labor, and overhead-to produce a product or provide a service. Every business prepares a cash budget. The cash budget shows expected cash receipts from selling goods or services, and planned cash disbursements in payment of bills incurred by the firm. As elements of a master budget, the budgeted or pro-forma financial statements show the overall financial results of the organization's planned operations for the budget period. These statements include the budgeted income statement, the budgeted balance sheet, and the budgeted statement of cash flows. In the part that follows the master budget for manufacturing firms will be illustrated and discussed in detail.

To some up, preparation of the master budget begins with the preparation of the planned operating budget-a budget prepared to plan future earnings which ultimately results in a proforma or budgeted income statement. Operating budgets, in brief, are concerned with the income-generating activities of a firm and are usually followed by financial budgets.

Example 1: To illustrate the budget process for merchandising firms, a hypothetical office supplies specialty store in Addis Ababa called ANC Company will be considered. The company prepares its master budget on a quarterly basis. The following data have been assembled to assist in the preparation of the master budget for the first quarter of 2005:

a) As of December 31, 2004, the company's general ledger showed the following account balances:

	Debit	Credit
Cash	Birr 48,000	
Accounts receivable	224,000	
Inventory	60,000	
Building and equipment (net)	370,000	
Accounts payable		Birr 93,000
Capital stock		500,000
Retained earnings		109,000
Total	Birr 702,000	Birr 702,000

b) Actual sales for December 2004 and budgeted sales for the next four months of 2005 are as follows:

December (actual)	Birr 280,000
Budgeted sales of 2005:	
January	400,000
February	600,000
March	300,000
April	200,000

c) Sales are 20% for cash and 80% on credit. All payments on credit sales are collected in the month following sale. The accounts receivable at December 31, 2004 are a result of December credit sales.

d) The company's gross profit rate is 40% of sales.

e) Monthly expenses are budgeted as follows:

Salaries and wages	Birr 27,000 per month
Advertising	Birr 70,000 per month
Shipping	5% of sales
Depreciation	Birr 14,000 per month
Other expenses	3% of sales

Note that cash expenses are paid as incurred.

f) At the end of each month, inventory is to be on hand (minimum required or desired inventory level) equal to 25% of the following month's sales needs, stated at cost inventory level) equal to 25% of the following month's sales needs, stated at cost.
g) One-half of a month's inventory purchases are paid for in the month of purchase, the other half is paid for in the following month.
h) During February, the company will purchase a new copy machine for Birr 1,700 cash. During March, other equipment will be purchased for cash at a cost of Birr 84,500.
i) During January, the company will declare and pay Birr 45,000 in cash dividends.
j) The company must maintain a minimum cash balance of Birr 30,000 each month. An open line of credit is available at a local bank for any borrowing that may be needed during the quarter. All borrowing is done at the beginning of a month, and all repayments are made at the end of a month. Borrowings and repayments of principal must be in multiples of Birr 1,000. Interest is paid only at the time of payment of principal. The annual interest rate is 12%.

SOLUTION

Operating Budget

Step 1: Sales Budget

ANC Company

Sales Budget

For the Quarter Ended March 31, 2005

	Months			Quarters
	January	February	March	
Budgeted cash sales (20%)	Birr 80,000	Birr 120,000	Birr 60,000	Birr 260,000
Budgeted credit sales (80%)	320,000	480,000	240,000	1,040,000
Total Budgeted sales	Birr 400,000	Birr 600,000	Birr 300,000	Birr 1,300,000

Step2: Cash Collections Budget

Schedule 1(b): Schedule of Expected Cash Collections

ANC Company

Cash Collection Budget

For the Quarter Ended March 31, 2005

	Months			Quarters
	January	February	March	
Accounts Receivable-beginning balance	Birr 224,000*	-	-	Birr 224,000
January sales (Birr 400,000) X 20%, 80%	80,000	Birr 320,000	-	400,000
February sales (Birr 600,000) X 20%,80%	-	120,000	480,000	600,000

March sales (Birr 300,000) X 20%	-	-	60,000**	60,000
Total expected cash collections	Birr 304,000	Birr 440,000	Birr 540,000	Birr 1,280,000

* Cash collection from last year's (year 2004) December sales.

** 80% X Birr 300,000 = Birr 240,000. This represents uncollected march sales and will appear as accounts receivable on the balance sheet prepared as of March 31, 2005.

Step 3: inventory Purchase Budget

Budgeted cost of goods sold

Months	Budgeted sales [a]	Cost of goods sold to sales percentage [b]	Budgeted Cost Of goods sold [c] = [a] x [b]
January	Birr 400,000	60%	Birr 240,000
February	600,000	60%	360,000
March	300,000	60%	180,000

Schedule 1 (c): Inventory Purchases Budget

ANC Company

Inventory Purchases Budget

For the Quarter Ended March 31,2005

	Months			Quarters
	January	February	March	
Budgeted costs of goods sold	Birr 240,000	Birr 360,000	Birr 180,000	Birr 780,000
Add: Desired ending inventory	90,000	45,000	30,000	30,000
Total inventory needed	Birr 330,000	Birr 405,000	Birr 210,000	Birr 810,000
Less: Beginning inventory	60,000	90,000	45,000	60,000
Required purchases	Birr 270,00	Birr 315,000	Birr165,000	Birr750,000

Desired-ending inventory

Months	Budgeted sales [a]	Cost of goods sold to sales percentage [b]	Sales needs stated At cost [c] = [a] x [b]
January	Birr 400,000	60%	Birr 240,000
February	600,000	60%	360,000
March	300,000	60%	180,000
March	200,000	60%	120,000

Desired ending inventory:

January = 25% x Birr 360,000 = Birr 90,000

February = 25% x Birr 180,000 = Birr 45,000

March = 25% x Birr 120,000 = Birr 30,000

Beginning inventory

Step 4: Cash Disbursement Budget

Schedule 1(d): Schedule of Expected Cash Disbursements for Inventory Purchases

ANC Company

Expected Cash Disbursements for Purchases Budget

For the Quarter Ended March 31,2005

	Months			Quarters
	January	February	March	
Accounts payable-beginning balance	Birr 93,000*	-	-	Birr 93,000
January purchases (Birr 270,000) X 50%, 50%	Birr 135,000	Birr 135,000	-	Birr 135,000
February purchases (Birr 315,000) X 50%, 50%	-	157,500	157,500	315,000
March purchases (Birr 165,000) X 50%	-	-	82,500**	82,500
Total disbursements for purchases	Birr 228,000	Birr 292,500	Birr 240,000	Birr 760,500

Step 5: Operating Expense Budget

Schedule 1 (e): Operating Expense Budget

ANC Company

Operating Expense Budget

For the Quarter Ended December 31, 20XX

	Months			Quarters
	January	February	March	
Salaries and wages	Birr 27,000	Birr 27,000	Birr 27,000	Birr 81,000
Advertising	70,000	70,000	70,000	210,000
Shipping (5% of sales)*	20,000	30,000	15,000	65,000
Depreciation	14,000	14,000	14,000	42,000
Other expenses (3% of sales)**	12,000	18,000	9,000	39,000
Total budgeted operating expenses	Birr 143,000	Birr 159,000	Birr 135,000	Birr 437,000

Months	Budgeted sales	Shipping * (5% of sales)	Other expenses (3% of sales)**
	[a]	[b] = 5% x [a]	[c] = 3% x [a]
January	Birr 400,000	Birr 20,000	Birr 12,000
February	600,000	Birr 30,000	18,000
March	300,000	Birr 15,000	9,000

Step 6: Disbursements for Operating Expenses Budget

Schedule 1(f): Schedule of Expected Cash Disbursements for operating expenses

ANC Company

Schedule of Expected Cash Disbursements for Operating Expense

For the Quarter Ended March 31,2005

	Months			Quarters
	January	February	March	
Salaries and wages	Birr 27,000	Birr 27,000	Birr 27,000	Birr 81,000
Advertising	70,000	70,000	70,000	210,000
Shipping (5% of sales)	20,000	30,000	15,000	65,000
Other expenses (3% of sales)	12,000	18,000	9,000	39,000
Total disbursements for operating expenses	Birr 129,000	Birr 145,000	Birr 121,000	Birr 395,000

Step 7: Budgeted Income Statement

Schedule 1 (g): Budgeted Income Statement

ANC Company

Budgeted Income Statement

For the Quarter Ended March 31, 2005

		Data Source
Sales	Birr 1,300,000	schedule 1(a)
Less cost of goods sold	780,000	schedule1 (c)
Gross margin	520,00	
Less operating expenses:		

Salaries and wages	Birr 81,000		schedule 1(e)
Advertising	210,000		schedule 1(e)
Shipping	65,000		schedule 1(e)
Depreciation	42,000		schedule 1(e)
Other expenses	39,000		schedule 1(e)
Total operating expenses		Birr 437,000	schedule 1(e)
Net operating income		Birr 83,000	
Less interest expense*		2,400	schedule 2(a)
Net income		Birr 80,600	

Financial Budget

Step 1: Cash Budget

Schedule 2 (a): Cash Budget

ANC Company

Cash Budget

For the Quarter Ended March 31,2005

	Months			Quarters
	January	February	March	
Cash balance, beginning	Birr 48,000	Birr 30,000	Birr 30,800	Birr 48,000
Add Cash Received				

Collection from customers	304,000	440,000	540,000	1,284,000
Total cash available [a]	Birr 352,000	Birr 470,00	Birr 570,000	Birr1,332,000
Less disbursements:				
Purchases of inventory	228,000	292,000	240,000	760,500
Operating expenses	129,000	145,000	121,000	395,000
Purchases of equipment	-	1,700	84,500	86,200
Cash dividends	45,000	-	-	45,000
Total disbursements [b]	402,000	439,200	445,500	1,286,700
Excess (deficiency) of cash [c] = [a] + [b]	Birr (50,000)	Birr 30,800	Birr 125,300	Birr 45,300
Financing:				
Borrowings (at beginning)	80,000	-	-	80,000
Repayments (at ending)	-	-	(80,000)	(80,000)
Interest	-	-	(2,400)	(2,400)
Total financing [d]	80,000	-	(82,400)	(2,400)
Cash balance, ending [e] = [c] + [d]	Birr 30,000	Birr 30,800	Birr 42,900	Birr 42,900

Step 2: Budgeted Balance Sheet

Schedule 2 (b): Budgeted Balance Sheet

ANC Company

Budgeted Balance Sheet

March 31,2005

Assets		
Current assets:		
Cash	Birr 42,900	
Accounts receivable	240,000	
Inventory	30,000	
Total current assets		Birr 312,000
Plant assets:		
Building and equipment (net)		414,200
Total Assets		Birr 727,100
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable		Birr 82,500
Stockholders' equity:		

Capital stock	Birr 500,000	
Retained earnings	144,600	
Total stockholders' equity		Birr 644,600
Total Liabilities and Stockholders' Equity		Birr727,100

2.10 CHAPTER SUMMARY

The following points are linked to the chapter's learning objectives:

The master budget summarizes the financial projections of all the organization's budgets and plans. It expresses management's comprehensive operating and financial plans—-the formalized outline of the organization's financial objectives and their means of attainment. Budgets are tools that by themselves are neither good nor bad. How managers administer budgets is the key to their value. When adniinistere4 wisely, budgets compel management planning, provide definite expectations that are an appropriate framework for judging subsequent performance, and promote communication and coordination among the various subunits of the organization.

The advantages of budgets include: (a) they compel planning, (b) they provide performance criteria, and (c) they promote coordination and communication within the organization.

The foundation for the operating budget is generally the revenues budget. The following supporting budget schedules are geared to the revenues budget: production budget, direct materials usage budget, direct materials purchases budget, direct manufacturing labor budget, manufacturing overhead costs budget, ending inventory budget, cost of goods sold budget, R&D/design budget, marketing budget, distribution budget, and customer-service budget. The operating budget ends with the budgeted income statement.

2.11 SELF TEST EXERCISE

PART I: TRUE /FALSE/

Instruction: dear learners, please Write "True" if the statement is correct and "False" if the statement is incorrect.

1. The master budget reflects the impact of operating decisions, but not financing decisions.
2. Budgeting helps management anticipate and adjust for trouble spots in advance.
3. The usual starting point in budgeting is to forecast net income.
4. Preparation of the budgeted income statement is the final step in preparing the operating budget.
5. The revenues budget should be based on the production budget.
6. The manufacturing labor budget depends on wage rates, production methods, and hiring plans.
7. A packaging department is MOST likely a profit center.
8. When the operating budget is used as a control device, managers are more likely to be motivated to budget higher sales than actually anticipated.

PART II: Multiple Choices

Select the best answer for each of the following multiple – choice questions:

1. Which of the following statements is false?
   A. The master budget is a flexible budget for the denominator activity level.
   B. The technique of flexible budgeting is used to fine tune the master budget for performance evaluation purposes, i.e., to prepare budgets which are comparable with the actual results.
   C. The master budget includes appropriation budgets.
   D. Appropriation budgets are used to set the maximum amounts for many types of discretionary expenditures.
2. Budgeted unit sales is normally determined by:
   A. The accounting department.
   B. The engineering department.
   C. The personnel department.
   D. The marketing department.
   E. None of these.

3. Standard quantities per unit of product for direct labor are normally determined by:
   A. The accounting department.
   B. The engineering department.
   C. The personnel department.
   D. The marketing department.
   E. None of these.
4. If a decrease in the time lag between ordering and receiving direct materials could be obtained by switching to a new vendor, then the average inventory of direct material could be decreased. This would most likely,
   A. Increase net income in the current month.
   B. Decrease cash outflows in the current month.
   C. Increase net income in future months as well as decrease cash outflows in the current and future periods.
   D. All of these.
   E. None of these.
5. Which of the following is a purpose or advantage of the master budget process?
   A. Coordination of the activities of the different functional areas of the firm.
   B. Communication to managers of how their efforts add value to the organization's products or services.
   C. Forces management to establish profit objectives.
   D. Provides a tool for evaluation and control.
   E. All of these.
6. Which of the following statements is true? The master budget process for a manufacturing firm
   A. May be referred to as either incremental budgeting or zero base budgeting.
   B. May include appropriation budgets.
   C. May include continuous budgets.
   D. b and c
   E. All of the above
7. Appropriation budgets are
   A. Flexible budgets

B. Static (fixed) budgets.
C. Incremental budgets.
D. Zero base budgets.
E. None of the above

8. The planned production volume variance is
   A. The difference between planned unit sales and production multiplied by the budgeted fixed overhead rate per unit.
   B. The difference between planned unit sales and denominator units multiplied by the budgeted fixed overhead rate per unit.
   C. The difference between planned production units and denominator units multiplied by the budgeted fixed overhead rate per unit.
   D. The difference between planned direct labor hours and actual direct labor hours multiplied by the fixed overhead rate per hour.
   E. None of these.
9. Measuring the firm's performance against established objectives is part of which of the following functions?

   A. Planning

   B. Controlling

   . C. Organizing

   D. Staffing

10. Strategic planning is

    A. Planning activities for promoting products for the future.

    B. Planning for appropriate assignments of resources.

    . C. Setting standards for the use of important but hard-to-find materials.

    D. Stating and establishing long-term plans.

11. The master budget is a static budget because it

A. Is geared to only one level of production and sales.

B. Never changes from one year to the next.

C. Covers a preset period of time.

. D. Always contains the same operating and financial budgets.

12. The material purchases budget tells a manager all of the following except the

A. Quantity of material to be purchased each period.

B. Quantity of material to be consumed each period.

C. Cost of material to be purchased each period.

. D. Cash payment for material each period.

13. Which of the following items would not be found in the financing section of the cash budget?

A. Cash payments for debt retirement

B. Cash payments for interest

C. Cash payments for sales of investments

. D. Payment of accounts payable

14. The primary reason that managers impose a minimum cash balance in the cash budget is

A. Because management needs discretionary cash for unforeseen business opportunities.

B. Managers lack discipline to control their spending.

C. That it protects the organization from the uncertainty of the budgeting process.

. D. That it makes the financial statements look more appealing to creditors.

15. In a responsibility accounting system, costs are classified into categories on the basis of

A. Fixed and variable costs.

B. Prime and overhead costs.

C. Administrative and non administrative costs.

. D. Controllable and non controllable costs.

PART III: WORK OUT

Work-out the following questions according to the directions beside each question.

1. In 2011, Rouse & Sons, a small environmental-testing firm, performed 12,200 radon tests for $290 each and 16,400 lead tests for $240 each. Because newer homes are being built with lead-free pipes, lead-testing volume is expected to decrease by 10% next year. However, awareness of radon-related health hazards is expected to result in a 6% increase in radon-test volume each year in the near future. Jim Rouse feels that if he lowers his price for lead testing to $230 per test, he will have to face only a 7% decline in lead-test sales in 2012.

Required

1. Prepare a 2012 sales budget for Rouse & Sons assuming that Rouse holds prices at 2011 levels.
2. Prepare a 2012 sales budget for Rouse & Sons assuming that Rouse lowers the price of a lead test to $230. Should Rouse lower the price of a lead test in 2012 if its goal is to maximize sales revenue?

2. The Mendez Company expects sales in 2012 of 200,000 units of serving trays. Mendez's beginning inventory for 2012 is 15,000 trays and its target ending inventory is 25,000 trays. Compute the number of trays budgeted for production in 2012.
3. Inglenook Co. produces wine. The company expects to produce 2,500,000 two-liter bottles of Chablis in 2012. Inglenook purchases empty glass bottles from an outside vendor. Its target

ending inventory of such bottles is 80,000; its beginning inventory is 50,000. For simplicity, ignore breakage. Compute the number of bottles to be purchased in 2012.

4. The Mahoney Company has prepared a sales budget of 45,000 finished units for a three-month period. The company has an inventory of 16,000 units of finished goods on hand at December 31 and has a target finished goods inventory of 18,000 units at the end of the succeeding quarter. It takes three gallons of direct materials to make one unit of finished product. The company has an inventory of 60,000 gallons of direct materials at December 31 and has a target ending inventory of 50,000 gallons at the end of the succeeding quarter. How many gallons of direct materials should be purchased during the three months ending March 31?

Chapter: 3 CHAPTER FLEXIBLE BUDGET, VARIANCES AND MANAGEMENT CONTROL

3.0 AIMS AND OBJECTIVES

Upon completing this unit, you should be able to:

- Distinguish between flexible budgets and master (static) budget
- Use flexible-budget formulas to construct a flexible budget based on the volume of sales
- Compute flexible-budget variance and sales activity variance.
- Explain the nature of standard costs.
- Distinguish among ideal, basic, normal and attainable standards.
- Describe the types and purposes of standard costs.
- Explain how direct materials standards and direct labor standards are set.
- Compute the direct materials price and quantity variances and explain their significance.
- Compute the direct labor rate and efficiency variances and explain their significance.
- Compute the manufacturing overhead variances.
- Explain several methods for determining the significance of cost variances.

3.1 Introduction

Hello Dear learners! In this chapter you will learn about Flexible Budget, Variances & Management control. A budget is a plan for the future. Hence, budgets are planning tools, and they are usually prepared prior to the start of the period being budgeted. However, the comparison of the budget to actual results provides valuable information about performance. Therefore, budgets are both planning tools and performance evaluation tools.

Usually, the single most important input in the budget is some measure of anticipated output. For a factory, this measure of output is the number of units of each product produced. For a retailer, it might be the number of units of each product sold. For a hospital, it is the number of patient days (the number of patient admissions multiplied by the average length of stay).

3.2 Static and Flexible Budget

The static budget is the budget that is based on this projected level of output, prior to the start of the period. In other words, the static budget is the "original" budget. The static budget variance is the difference between any line-item in this original budget and the corresponding line-item from the statement of actual results. Often, the line-item of most interest is the "bottom line": total cost of production for the factory and other cost centers; net income for profit centers.

Budgeted Revenue = Budgeted Sales in quantity X Budgeted Price per unit

Budgeted Cost = Budgeted VC + Budgeted FC

Budgeted Revenue = Budgeted Output in quantity X Budgeted Variable Cost per unit

Level refers to the detailed expression of the variance.

Static Budget Variance = Actual Budget - Static Budget

Favorable Variance:

For Revenue: Actual Revenue > Budgeted Revenue

For Cost: Actual Cost < Budgeted Cost

Unfavorable Variance:

For Revenue: Actual Revenue > Budgeted Revenue

For Cost: Actual Cost > Budgeted Cost

The flexible budget is a performance evaluation tool. It cannot be prepared before the end of the period. A flexible budget adjusts the static budget for the actual level of output. The 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?*" The motivation for the flexible budget is to compare apples to apples. If the factory actually produced 10,000 units, then management should compare actual factory costs for 10,000 units to what the factory should have spent to make 10,000 units, not to what the factory should have spent to make 9,000 units or 11,000 units or any other production level.

The flexible budget variance is the difference between any line-item in the flexible budget and the corresponding line-item from the statement of actual results.

Budgeted Revenue = Actual Sales in quantity X Budgeted Price per unit

Budgeted Cost = Budgeted VC + Budgeted FC

Budgeted VC = Actual Output in quantity X Budgeted Variable Cost per unit

The following steps are used to prepare a flexible budget:

1. Determine the budgeted variable cost per unit of output. Also determine the budgeted sales price per unit of output, if the entity to which the budget applies generates revenue (e.g., the retailer or the hospital).
2. Determine the budgeted level of fixed costs.
3. Determine the actual volume of output achieved (e.g., units produced for a factory, units sold for a retailer, patient days for a hospital).
4. Build the flexible budget based on the budgeted cost information from steps 1 and 2, and the actual volume of output from step 3.

Flexible budgets are prepared at the end of the period, when actual output is known. However, the same steps described above for creating the flexible budget can be used prior to the start of the period to anticipate costs and revenues for any projected level of output, where the projected level of output is incorporated at step 3. If these steps are applied to various anticipated levels of output, the analysis is called pro forma analysis. Pro forma analysis is useful for planning purposes. For example, if next year's sales are double this year's sales, what will be the company's cash, materials, and labor requirements in order to meet production needs?

The difference between static Budget and flexible budget is known as *Sales Volume Variance (SVV).*

The difference between Flexible Budget and Actual budget is known as *Flexible Budget Variance (FBV).*

FBV + SVV = Static Budget Variance

Actual Results:

Actual Revenue = Actual Sales in quantity X Actual Price per unit

Actual Cost = Actual VC + Actual FC

Actual VC = Actual Output in quantity X Actual Variable Cost per unit

Quick Check exercise

Distinguish between a favorable variance and an unfavorable variance.

What is the key difference between a static budget and a flexible budget?

Illustrative examples

Item	Actual Results	Static Budget
Units Sold	10,000	12,000
Revenue	$1,850,000	$2,160,000
Variable Cost	$1,120,000	$1,188,000
Fixed Cost	$705,000	$710,000
Operating Income	$25,000	$262,000

Budgeted cost for five items

DM – 2 square yard of cloth inputs per output at $30 per square yard.

Direct Manufacturing Labour: 0.8 mfg labour hour per output at $20 per hour.

Direct Marketing Labour: 0.25 labour hour per output at $24 per hour.

Variable manufacturing overhead: allocated on the basis of 1.20 machine hours per output units manufactured at $10 Standard Cost per machine hours.

Variable Marketing Over head: allocated on the basis of 0.125 direct marketing labour hours output sold at $40 Standard Cost per machine hours.

Actual cost for five items

DM – 22,200 square yards of cloths at $31 each.

Direct Manufacturing Labour: 9,000 mfg labour hours at $22 each.

Direct Marketing Labour: 2,304 Direct Marketing Labour at $25 each.

Variable Manufacturing Overhead: $130,500

Variable Marketing Over head: $45,700

Solution

Level Zero Analysis			
Actual Operating Income		25,000	
Budgeted Operating Income		262,000	
Static Budget variance		237,000 (U)	
Level One Analysis			
	Actual Result	SBV	Static Result
Unit Sold	10,000	2,000(U)	12,000
Revenue	1,850,000	310,000(U)	2,160,000
Variable Cost	1,120,000	68,000(F)	1,188,000
Contribution Margin	730,000	242,000(U)	972,000
Fixed Cost	705,000	5,000(F)	710,000
Operating Income	25,000	237,000(U)	262,000

3.3 Performance Evaluation Using Flexible Budget

There are basically two reasons why actual results may differ from master budget. These are:

- Sales and other cost driver activities were not the same as originally forecasted.
- Revenue or Variable cost per units of activity and Fixed Costs per period were not as expected.
- The variance that is obtained between flexible budget and actual result tells us the reason why the changes exist.
- The difference between fixed cost in flexible budget and static budget is Zero. When evaluating performance, it is useful to distinguish between:
- Effectiveness: the degree to which the target is met.
- Efficiency: the degree to which inputs are used in relation to a given level of output. Flexible budget variance measure efficiency of operations at actual level of output in the activity.

	Actual Result	FBV	FB	SVV	Static Budget
Unit Sold	10,000	0	10,000	2,000(U)	12,000
Revenue	1,850,000	50,000(F)	1,800,000	360,000(U)	2,160,000
Variable Cost	1,120,000	130,000(U)	990,000	198,000(F)	1,188,000
Contribution Margin	730,000	80,000(U)	810,000	162,000(U)	972,000
Fixed Cost	705,000	5,000(F)	710,000	0	710,000
Operating Income	25,000	75,000 (U)	100,000	162,000(U)	262,000

SBV = SVV + FBV =75,000 (U) +162,000(U) = 237,000(U)

$$Budgetedpriceperunit \quad \frac{Budgeted\ \text{Re}\ venue}{Budgetedoutputinquantity} \quad \frac{2{,}160{,}000}{12{,}000} \quad 180$$

Budgeted Revenue for FB = BPPU X Actual Output in quantity

= 180 X 10,000 = 1,800,000

We can use similar step for Variable cost FB.

Quick Check exercise: Why might managers find a flexible-budget analysis more informative than a static -actualbudgetcostsanalysis?

3.4 Standard Costing

When actual costs are compared with budgeted costs, the comparison is made of the total cost for the line item under consideration (e.g. cost of various types of materials, cost of various categories of labor or cost of a range of categories of overheads). Where there is a significant variance between the budget and the actual outcome, that variance may be investigated. (It has to be remembered, however, that the investigation will itself have a cost and that cost may be minimized by first trying to narrow down the causes of the difference.)

To analyze the difference between what was expected and what actually happened, it is useful to make comparisons in terms of cost per unit rather than total cost of a line item in the budget. Such costs per unit may be estimated in advance and used as a standard against which to compare the actual costs incurred. The cost per unit, measured in advance of the operations to be undertaken, is called a standard cost.

Once the standard cost has been decided, the actual cost may be compared with the standard. If it equals the standard, then the actual outcome has matched expectations. If the actual cost is greater than, or less than, the standard cost allowed, then there will be a variance to be investigated. This chapter explains how the standard costs may be determined and how the variances may be quantified. In the definition of a variance the use of a standard cost is now added.

3.4.1 Purpose of Using Standard Costs

Actual costs are measured after the event by reference to the quantity of the resource used and its price. When the actual cost is measured there is no doubt as to the quantity and price.

Standard costs are measured in advance of the period of time to which they relate, so that estimation is necessary. This requires estimation of physical inputs and outputs, and monetary estimates of prices of inputs and outputs. In order to determine useful standards it is necessary

first of all to consider the purpose for which the standards will be used. The purpose could cover any or all of the following:

1) To provide product costs for stock valuation;
2) To increase control within a budgeting system;
3) To gauge performance of a business unit by use of variance analysis;
4) To integrate costs in the planning and pricing structure of a business;
5) To reduce record-keeping costs when transactions take place at different prices.

3.4.2 The Level of Output to be used in Setting Standards

The heart of the standard costing is setting of standards. Standard setting should be done extremely carefully to ensure that the standards are realistic and neither too high nor too low. If very high standards are set, it will be impossible to attain the same and there will be always an adverse variance. This will result in lowering the morale of the employees. On the other hand, if standards are set too low, they will be attained very easily and the favorable variances will create complacency amongst the employees. In view of this, the standards should be set very carefully.

Calculation of the standard cost requires a view to be taken on the most appropriate physical measurement to incorporate in the cost calculation. Five approaches are instanced here. The first uses a basic level of output, the second looks to an ideal level of output, the third uses a currently attainable level of output, the forth uses an expected level of output and the fifth uses a historical level of outputs.

The basic standard is one which never changes and consequently remains a permanent basis for comparison. This gives a base line against which to make long-term comparisons. It has the disadvantage of becoming increasingly unrealistic as circumstances change.

The ideal standard is one which applies in dream conditions where nothing ever goes wrong. It represents the cost to be incurred under the most efficient operating conditions. It is an almost unattainable target towards which an organization may constantly aim, but it may also cause a lowering of morale in the organization if staff can never reach the target.

The Currently attainable standards lie between these two extremes, defined as standards which should normally equal expectations under ‘normally efficient operating conditions’. They may

represent quite stiff targets to reach, but they are not beyond possibility. Currently attainable standards are the most frequently used because they give a fair base for comparisons, they set a standard which ought to be achieved and they give staff a sense of achievement when the attainable target is reached.

The Expected Standard is a standard, which, it is anticipated, can be attained during a future specified standard period. This standard is quite attainable; it is consistent and hence fulfils all the purposes of a good standard. It provides incentive to improve performance and get the better of the adverse conditions. These standards are formulated after making allowance for the cost of normal spoilage, cost of idle time due to machine breakdowns, and the cost of other events, which are unavoidable in normal efficient operations. Thus all the normal losses are taken into consideration. These standards are most accurate and very useful to the management in product costing, inventory valuations, estimates, analyses, performance evaluation, planning, and employee motivation for managerial decision-making.

The Historical Standard is the average standard, which has been achieved in the past. This standard tends to be a loose standard because there is a possibility that the average past performance may include inefficiencies, which will be passed on the new standards. However the utility of these standards is that past performance can be used as a basis for setting of standard in future.

3.4.3 Advantages of Standard Costing

Advantages of a standard-costing system include the following:

1) Standard costs provide a basis for sensible cost comparisons. Standard costs enable the managerial accountant to compute the standard allowed cost, given actual output, which then serves as a sensible benchmark to compare with the actual cost incurred.
2) Computation of standard costs and cost variances enables managers to employ management by exception.
3) Variances provide a means of performance evaluation and rewards for employees.
4) Since the variances are used in performance evaluation, they provide motivation for employees to adhere to standards.

5) Use of standard costs in product costing results in more stable product costs than if actual production costs were used.
6) A standard-costing system usually is less expensive than an actual- or normal costing system.

3.5 Cost Variances for Direct Materials and Labor

In the previous parts, we saw that the *static budget variance* measures the difference between budgeted costs and actual costs (or budgeted revenues and actual revenues). We also saw that when the actual volume of output (sales or production) differs from the budgeted volume of output, this difference contributes to the static budget variance. We saw that a *flexible budget* adjusts the static budget to reflect what the budget would have looked like, if the actual output volume could have been known in advance. The *flexible budget variance* measures the difference between the flexible budget and actual results.

As stated in the previous part, there can be only two explanations for the flexible budget variance for variable costs. First, there can be a difference between budgeted input prices and actual input prices: the company paid more per yard of fabric, or less per pound of steel, than planned. Second, there can be an efficiency piece: the company used more fabric per pair of pants, or fewer pounds of steel per widget, than planned. In this chapter, we separate the flexible budget variance for direct materials into these two pieces: the "price" piece, and the "efficiency" piece. At the end of the chapter, we extend the discussion to other variable costs: direct labor and variable overhead.

The three primary sources of variances are:

a) price variances which arise because factor input prices differ from standards;
b) Efficiency variances which occur when the relationship between the usage of input factors (labor, materials, variable overhead) differs from that which would be expected to produce a given level of output; and
c) Activity variances which represent differences between planned (master budget) output levels and the output levels actually attained during the period.

Notation:

The following concepts and abbreviations are used:

Inputs are the materials used in the production process (fabric or steel).

Outputs are the units of finished product (pairs of pants, or widgets).

Abbreviation	Definition	Explanation
Q	Quantity	The *total* quantity of *inputs* used in production(the inputs for all output units, not the inputs for one unit of output)
P	Price	The price per unit of input
AP	Actual Price	The actual price paid per unit of input
SP	Standard Price	The budgeted price paid per unit of input
AQ	Actual Quantity	The actual quantity of inputs used in production
SQ	Standard Quantity	The quantity of inputs that "should have been used" for the actual output produced

Sometimes Q refers to the total quantity of inputs *purchased*, not used in production. We will return to this possibility later in this chapter, but for now, Q refers to the quantity used in production.

The most important concept identified above is the Standard Quantity (SQ). SQ is a *flexible budget* concept: it is the quantity of inputs that would have been budgeted had the budget correctly anticipated the actual volume of output.

Direct Materials Variances

In the material variances, the main objective is to find out the difference between the standard cost of material used for actual production and actual cost of material used. Thus the main

variance in this category is the cost variance, which is thereafter broken down into other variances. These variances are given below.

Material Cost Variance:

As mentioned above, this variance shows the difference between the standard cost of material consumed for actual production and the actual cost. The following formula is used for computation of this variance.

Material Cost Variance = Standard Cost of Material Consumed for Actual Production – Actual Cost

If the actual cost of material consumed is less than the standard cost of material consumed, the variance is 'favourable', otherwise it is adverse.

Material Price Variance:

One of the reasons for difference between the standard material cost and actual material cost is the difference between the standard price and actual price. Material Price Variance measures the difference between the standard price and actual price with reference to the actual quantity consumed.

Given these definitions, the flexible budget can be expressed as

SQ x SP;

and the flexible budget variance can be expressed as

(AQ x AP) – (SQ x SP) (1)

By introducing the following expression, we can separate the flexible budget variance into two pieces.

AQ x SP

This expression measures what the company "should have spent" for the actual quantity of inputs used. We insert this expression into Equation (1) for the flexible budget variance:

$$(AQ \times AP) - (AQ \times SP) - (SQ \times SP) \qquad (2)$$

The first difference in Equation (2) can be rewritten as follows:

$$(AQ \times AP) - (AQ \times SP) = AQ \times (AP - SP)$$

This expression is the price variance. The price variance is abbreviated PV. Hence:

$$PV = AQ \times (AP - SP)$$

If the term in parenthesis is positive, the factory paid more per unit of input than budgeted, and the price variance is unfavorable. If the term in parenthesis is negative, the factory paid less per unit of input than budgeted, and the price variance is favorable. In either case, the price variance can be interpreted as answering the following question: *What was the total impact on the cost of production caused by the fact that the actual price per unit of input differed from the budgeted price*

Material Quantity [Usage] Variance

This variance measures the difference between the standard quantity of material consumed for actual production and the actual quantity consumed and the same is multiplied by standard price.

$$(AQ \times SP) - (SQ \times SP) = SP \times (AQ - SQ)$$

This expression is the quantity variance (also called the usage variance). It is the budgeted price per unit of input (SP) multiplied by the difference between the quantities of inputs that should have been used for the output units produced (SQ) and the quantity of inputs actually used (AQ). The quantity variance is abbreviated QV. Hence:

$$QV = SP \times (AQ - SQ)$$

If the term in parenthesis is positive, the factory used more inputs than it should have used for the amount of output units produced, and the quantity variance is unfavorable. If the term in parenthesis is negative, the factory used fewer inputs than it should have used for the amount of output units produced, and the quantity variance is favorable. In either case, the quantity variance can be interpreted as answering the following question: *What was the total impact on the cost of*

production caused by the fact that the quantity of inputs used to make each unit of output differed from budget.

Timing of Recognition of the Price Variance:

Some firms recognize the price variance for direct materials when the raw materials are purchased, rather than waiting until the raw materials are put into production. In this case, the AQ in the price variance will generally differ from the AQ in the quantity variance, which is denoted in the following expressions for these variances:

$$PV = AQ_{Purchased} \times (AP - SP)$$

$$QV = SP \times (AQ_{Used} - SQ)$$

Where usually, $AQ_{Purchased} AQ_{Used}$

Recognizing the price variance when raw materials are purchased provides more timely information to management about the cost of direct materials and the performance of the purchasing department. Hence, this method for calculating the price variance has much to commend it. However, in this situation, the sum of the price variance and quantity variance will not equal the flexible budget variance, except by coincidence or when beginning and ending quantities of raw materials are zero.

Cost Variances and External Reporting:

Cost variances are not reported separately in the external financial statements of a firm, but are implicitly incorporated in one or more line-items on the balance sheet and income statement, such as Cost of Goods Sold and ending Finished Goods Inventory. However, for internal reporting, cost variances are frequently reported as separate line-items on divisional income statements and product-specific profit statements.

Quick Check exercise: How might a manager gain insight into the causes of a flexible-budget variance for direct materials?

Cost Variances for Direct Labor

Like the material variances, labour variances arise due to the difference between the standard labour cost for actual production and the actual labour cost. The following variances are computed in case of direct labour.

Labour Cost Variance:

This variance is the main variance in case of labour and arises due to the difference between the standard labour cost for actual production and the actual labour cost. The following formula is used for computation of this variance.

Labour Cost Variance = Standard Labour Cost for Actual Production – Actual Labour Cost

This variance will be favourable is the actual labour cost is less than the standard labour cost and adverse if the actual labour cost is more than the standard labour cost.

Labor Rate Variance:

One of the reasons for labor cost variance is the difference between the standard rate of wages and actual wages rate. The labor rate variance indicates the difference between the standard labor rate and the actual labor rate paid.

The formulas for splitting the flexible budget variance into a "price" variance and "quantity" variance are the same for direct labor as direct materials. However, the terminology differs slightly. What is called the price variance for direct materials is called the rate variance or wage rate variance for direct labor. However, we retain the same abbreviations:

$$PV = AQ \times (AP - SP)$$

Where AQ is the actual labor hours used in production, AP is the actual wage rate, and SP is the budgeted wage rate.

This variance will be favorable if the actual rate paid is less than the standard rate. The labour rate variance is that portion of direct labor cost variance, which is due to the difference between the labor rates.

Labor Efficiency Variance:

It is of paramount importance that efficiency of labor is measured. For doing this, the actual time taken by the workers should be compared with the standard time allowed for the job. The standard time allowed for a particular job is decided with the help of time and motion study.

What is called the quantity or usage variance for direct materials is called the efficiency variance for direct labor. We abbreviate this variance as EV:

$$EV = SP \times (AQ - SQ)$$

Where SP and AQ are the same as above and SQ is the flexible budget quantity of labor hours (the labor hours the factory should have used for the volume of output units produced).

This variance will be favorable is the actual time taken is less than the standard time.

The issue discussed earlier in this chapter regarding the timing of the recognition of the price variance for direct materials does not arise for direct labor. Consequently, for direct labor, the sum of the wage rate variance and efficiency variance always equals the flexible budget variance.

Example: The Blue Moose Restaurant makes and sells sandwiches. The Restaurant makes and sells a lot of sandwiches. Following is the restaurant's budget for making a peanut butter and jelly sandwich:

<u>Direct Materials:</u>

Bread:

Quantity: 2 slices of bread (you probably knew this)

Price: Birr 0.10 per slice of bread

Peanut butter:

Quantity: 3 tablespoons

Price: Birr 0.05 per tablespoon

Jelly:

Quantity: 4 tablespoons

Price: Birr 0.03 per tablespoon

Direct labor:

Quantity: two minutes of labor

Wage rate: Birr 12 per hour (Birr 0.20 per minute)

The static budget for May indicated a production and sales level of 1,100 peanut butter and jelly sandwiches. In fact, the restaurant made and sold 1,000 peanut butter and jelly sandwiches. The total cost in direct materials and labor to make these 1,000 sandwiches was Birr 520 for ingredients and Birr 450 for labor.

Required:

1) What is the budgeted cost per unit for making a peanut butter and jelly sandwich?
2) What would the static budget show, in total, for the cost of production for all peanut butter and jelly sandwiches?
3) What would the flexible budget show, in total, for the cost of production for all peanut butter and jelly sandwiches? Show materials separately from labor.
4) What is the flexible budget variance? Show this variance separately for materials and labor. Is the flexible budget variance favorable or unfavorable?
5) Each loaf of bread contains 20 slices of bread. 105 loafs of bread were used to make all of the peanut butter and jelly sandwiches. The actual price paid per loaf was Birr 2.20. Calculate the quantity (usage) variance for bread. Provide a possible explanation for this variance.
6) What is the price variance for bread? Is it favorable or unfavorable?
7) 30 labor hours were spent making peanut butter and jelly sandwiches, at an average wage rate of Birr 15 per hour. What is the efficiency variance for labor?
8) What is the wage rate variance?

Solutions:

1. What is the budgeted cost per unit for making a peanut butter and jelly sandwich?

Bread	Birr 0.20
Peanut butter	Birr 0.15
Jelly	Birr 0.12
Labor	Birr 0.40
	Birr 0.87

2. What would the static budget show, in total, for the cost of production for all peanut butter and jelly sandwiches?

Birr 0.87 per sandwich x 1,100 sandwiches = Birr 957.

3. What would the flexible budget show, in total, for the cost of production for all peanut butter and jelly sandwiches? Show materials separately from labor.

Ingredients	Birr 0.47 x 1,000 =	Birr 470
Labor	Birr 0.40 x 1,000 =	Birr 400
Total		Birr 870

4. What is the flexible budget variance? Show this variance separately for materials and labor. Is the flexible budget variance favorable or unfavorable?

Ingredients	Birr 520 actual	Birr 470 budgeted =	Birr 50 unfavorable
Labor	Birr 450 actual	Birr 400 budgeted =	Birr 50 unfavorable
Total			Birr 100 unfavorable

4. Each loaf of bread contains 20 slices of bread. 105 loafs of bread were used to make all of the peanut butter and jelly sandwiches. The actual price paid per loaf was Birr 2.20. Calculate the quantity (usage) variance for bread. Provide a possible explanation for this variance.

SP x (AQ – SQ)

= Birr 0.10 per slice x (2,100 actual slices – 2,000 flexible budget slices)

= Birr 10 unfavorable

Possible reasons for the unfavorable usage variance for bread include the following:

1. Some of the bread was stale.
2. Some bread was dropped on the floor and not used
3. The 20 slices per loaf includes the heels, which are not used.

6. What is the price variance for bread? Is it favorable or unfavorable?

AQ x (AP – SP)

= 2,100 slices of bread x (Birr 0.11 per slice Birr 0.10 per slice) =

Birr 21 unfavorable

5.30 labor hours were spent making peanut butter and jelly sandwiches, at an average wage rate of Birr 15 per hour. What is the efficiency variance for labor?

SP x (AQ – SQ)

= Birr 12 per hour x (30.00 actual hours – 33.33 flexible budget hours)

= Birr 40 favorable

1.What is the wage rate variance?

AQ x (AP – SP)

= 30 actual hours x (Birr 15 actual wage rate – Birr 12 budgeted wage rate)

= Birr 90 unfavorable

Overhead Variance

The flexible overhead budget is the managerial accountant's primary tool for the control of manufacturing overhead costs. At the end of each accounting period, the managerial accountant uses the flexible overhead budget to determine the level of overhead cost that should have been incurred, given the actual level of activity. Then the accountant compares the overhead cost in the flexible budget with the actual overhead cost incurred. The marginal accountant, given the necessary data computes four separate overhead variances, each of which conveys information useful in controlling overhead costs.

To illustrate overhead variance analysis, we will continue the illustration of the XYZ Carpenters Share Company. During the month of January, the company produced 2,500 tables. Since production standards allow 4 machines–hours per table, the total standard allowed number of machine hours for the actual output is computed as follows:

Actual Production Output	2,500 Tables
Standard Allowed Machine Hours Per Table	X 4
Total Standard Allowed Machine Hours	10,000 Machines Hours

Thus, 10,000 machines–hours represent the standard machine-hours allowed for the actual production of 2,500 tables. This means, according to the standard, only 10,000 hours of machine time should have been used to manufacture the 2,500 tables actually produced in January. From the 10,000 machine-hours column in the columnar flexible budget prepared earlier, the budgeted overhead cost for January is follows:

Budgeted Overhead Cost For January

Variable Overhead	Birr 65,000
Fixed Overhead	42,000

From the cost-accounting records of the company, the controller determined that the following overhead costs were actually incurred during January to produce the 2,500 tables:

Actual Costs For January	
Variable Overhead	Birr 71,400
Fixed Overhead	43,800
Total Overhead	Birr 115,200

The production supervisor's records of the company indicate that the actual machine-hours used during January to produce the 2,500 tables were 10,500 hours. Notice that the actual number of machine-hours used (10,500 hours exceeds the standard allowed number of machine hours 10,000 hours), given the actual production output 2,500 tables. Now all of the information necessary to compute XYZ Carpenters Share company's overhead variances for January is assembled.

Therefore, in the discussions that follow in this section, you will study how overhead cost variances are computed and interpreted.

The company's total variable-overhead variance for January is computed below:

Actual Variable Overhead	Birr 71,400
Budgeted Variable Overhead	65,000
Total Variable–Overhead Variance	Birr 6,400 U

Variable Overhead Variance

What caused the company to spend Birr 6,400 more than the budgeted amount on variable overhead? To discover the reasons behind this performance, the managerial accountant computes

the following variable overhead variances variable–overhead spending variance, and variable–overhead efficiency variance.

Before we move in to the computation of these variances, carefully note the following symbols:

AH = Actual hours (machine-hours in our case)

AR = Actual variable-overhand rate

SR = Standard variable-overhand rate

SH = Standard hours (machine hours in our case) allowed for actual output

Variable Overhead Spending Variance

The spending variance addresses the question, "How much should have been spent on overhead, given the actual input?" It is a comparison of actual overhead with a flexible budget based on actual hours.

To compute this variance, we use the formula given below:

$$\text{Variable OH Spending Variance} = \text{Actual Variable OH} - \text{AH} \times \text{SR}$$

Because actual variable overhead is equal to actual hours (AH) times the actual variable overhead rate (AR), the above formula could be rewritten as follows:

$$\text{Variable OH Spending Variance} = \text{AH} \times \text{AR} - \text{AH} \times \text{SR} = \text{AH} \times (\text{AR} - \text{SR})$$

Notice that the actual variable–overhead rate (AR) is computed using the formula giving below.

$$\text{AR} = \frac{\text{Actual Variable OH}}{\text{Actual Hours}}$$

The AR for the XYZ Carpenters Share Company is Birr 6.80 per machine hair as computed below:

$$\text{AR} = \frac{\$71{,}400}{10{,}500 \text{ Hours}} = \$6.80$$

Using the information at hand, let us now compute the variable-overheard spending variance for the company.

Variable	OH Spending Variance	Actual Variable OH	AH x SR	
Variable	OH Spending Variance	$71,400	10,500 x $6.80	$3,150 Unfavourable

You can also apply the other formula given above to compute variable-overheard spending variance for the company as indicated below:

Variable	OH Spending Variance	AH x AR	AH x SR	AH x AR	SR
Variable	*OH Spending Variance*	10,500 *x* $6.80	10,500 *x* $6.50	$3,150*U*	

The variable-overhead spending variance is unfavorable because the actual variable-overhead cost exceeded the expected amount, after adjusting that expectation for the actual number of machine hours used or worked. Notice that the Birr 6.50 standard variable overhead rate was calculated in our previous discussions under the topic "Flexible overhead budget"

Variable–Overhead Efficiency Variance

The efficiency variance measures the amount of overhead variance attributable to using more or less inputs than allowed by the standards, given the amount of production. If actual hours worked are fewer than standard hours, the efficiency variance is favorable. An unfavorable variance occurs when actual hours exceed standard hours. To compute this variance, we use the formula given below:

Variable	OH Efficiency Variance	AH x SR	SH x SR

XYZ Carpenter Share Company's variable- overhead efficient variance for January is computed as follows:

Variable OH EfficiencyVariance	10,500*x* $6.80	10,000*x* $6.50	$3,250*U*

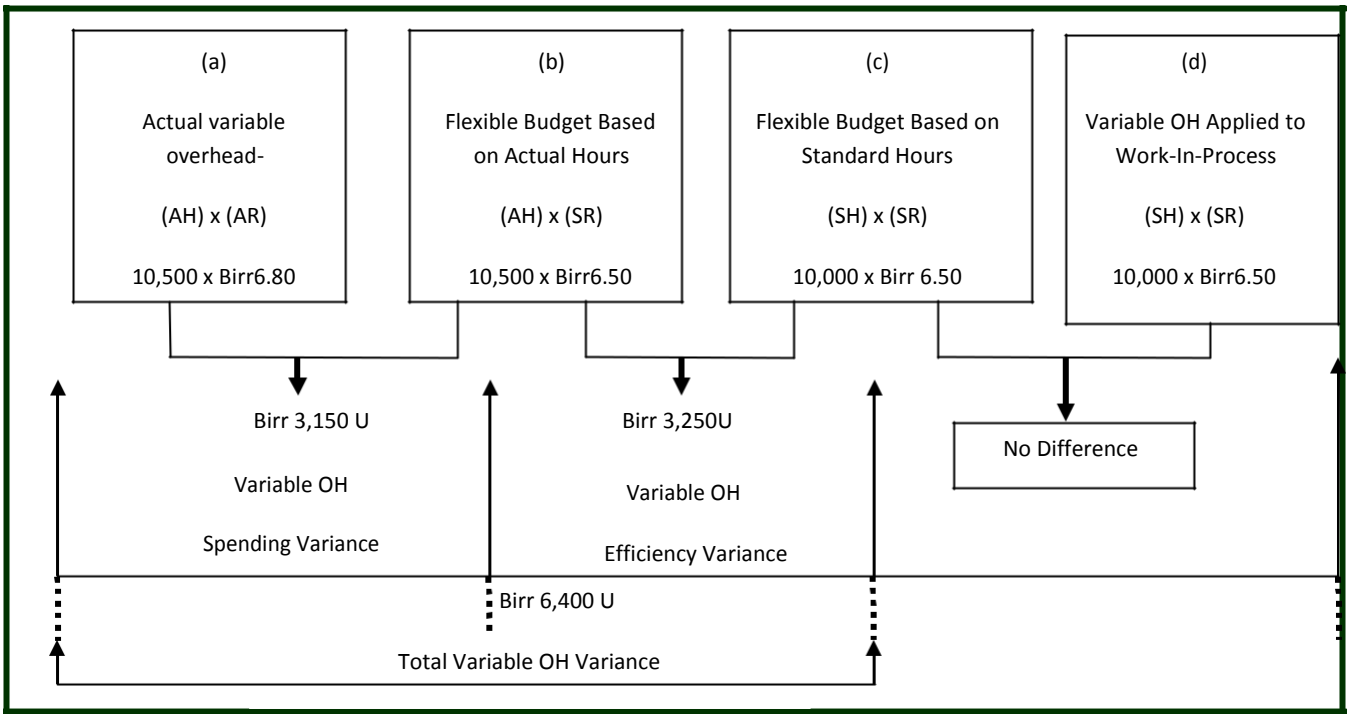
The above formula can be simplified by expressing it in factored from as follows:

Variable OH Efficiency Variance SR x AH SH

The variable-overhead efficiency variance is unfavorable because actual machine hours (10,500 hours) exceeded the standard allowed machine hours (10,000 hours) for the actual output (2,500 tables) manufactured in January. Now carefully observe that, as shown below, the total variable –overhead variance is the sum of the variable – overhead spending and efficiency variances:

Variable–Overhead Spending Variance	Birr 3,150 U
Variable–Overhead Efficiency Variance	3,250 U
Total Variable–Overhead Variance	Birr 6,400 U

The variable–overhead spending variance measures the aggregate effect of differences between the actual variable–overhead rate and the standard efficiency variance, in contrast, measures the aggregate effect of differences between the actual activity base and the standard activity base allowed for the actual output achieved. Recall that the activity base in the XYZ Carpenters Share Company problem is machine hours. A summary of variable variances is presented in the table that follows. Notice, in this table, that "hours" represent machine hours and rates per "hour" stand to indicate rates per machine hour.



Columns (a), (b), and (c) in the above table are used to compute the variances for cost-control purposes. Column (d), in contrast, is not used to compute the variances. This last column is included to point out that the flexible–budget amount for variable overhead (Birr 65,000) is the amount that will be applied to work in process inventory for product-costing purposes. In brief, column (d) shows the variable overhead applied to work in process for the product costing purpose.

What do the variable–overhead variances mean? What information do they convey to management? Let us see the interpretations of the variable-overhead spending variance and that of the variable–overhead efficiency variance in the discussion that follows.

Interpreting Variable-Overhead Spending variance

The variable overhead spending variance is useful only if the cost driver for variable overhead really is the actual hours worked. Then the flexible budget based on the actual hours worked is a valid benchmark that tells us how much should have been spent in total on variable overhead items during the period. The actual overhead costs would be larger than this benchmark, resulting in an unfavorable variance, if either:

The variable overhead items cost more to purchase than the standards allow, or

More variable overhead items were used than the standards allow.

So the spending variance includes both price and quantity variances. In principle, these variances could be separately reported, but this is seldom done. Ordinary, the price element in this variance may be small, so the variance will mainly be influenced by how efficiently variable overhead resources such as production supplies are used.

In brief, an unfavorable spending variance simply means that the total actual cost of variable overhead is greater than expected, after adjusting for the actual quantity of machine hours used. An unfavorable spending variance could result from paying a higher than expected price per unit for variable-overhead items, or the variance could result from using more of the variable-overhead items than expected. Suppose for example, that electricity were the only variable-overhead cost item. An unfavorable variable-overhead spending variance could result from paying a higher than expected price per kilowatt-hour for electricity, from using more than the expected amount of electricity, or from both.

Interpreting Variable-Overhead Efficiency Variance

Like the variable-overhead spending variance, the variable-overhead efficiency variance is useful only if the cost driver for variable overhead really is the actual hours worked. Then any increase in hours actually worked should result in additional variable overhead costs. Consequently, if too many hours were used to produce the actual output, this is likely to result in an increase in variable overhead. The variable-overhead efficiency variance is an estimate of the effect on variable overhead costs of inefficiency in the use of the base (i.e., hours). In a sense, the term variable-overhead efficiency variance is a misnomer. It seems to suggest that it measures the efficiency with which variable overhead resources were used while it does not. It is rather an estimate of the indirect effect on variable overhead cost of inefficiency in the use of the activity base (machine hours in our case). Notice from the discussions made earlier that the variable–-overhead efficiency variance is a function of the difference between the actual hours worked and the hours that should have been worked to produce the period's actual output. If more hours are worked than are allowed at standard, then the overhead efficiency variance will be unfavorable.

However, as discussed above, the efficiency is not in the use of overhead but rather in the use of the base itself.

In the XYZ Carpenters Share Company example, 500 more machine hours (10,500 actual hours less 10,000 stand and hours) were used during January than should have been used to produce the January's actual output (2,500 tables). Each of these 500 more hours presumably required the incurrence of Birr 6.50 of variable overhead cost, resulting in an unfavorable variance of Birr 3,250 (500 hours x Birr 6.50 = Birr 3,250). Although this Birr 3,250 variance is called an overhead efficiency variance it could better be called a machine-hours efficiency variance, since it results from using too many machine–hours rather than from inefficient use of overhead resources.

Example

Item	Actual Results	Flexible Budget Amount
Out Put Units	10,000	10,000
Machine Hours	4,500	4,000
Machine Hour Per Out Put	0.45	0.40
VMOH Cost	$130,500	$120,000
VMOH Cost/machine hours	$29	$30
VMOH Cost/Out Put	13.05	12

Required: Compute the following VMOH Variance

1. VMOH Flexible Budget Variance
2. VMOH Efficiency Variance
3. VMOH Spending Variance

Solution	
FBV of VOH	130,500 – 120,000 = 10,500 (U)

EV of VOH	(4,500 – 4,000) X $30= 15,000 (U)
SP of VOH	($29 - $30) X 4,500 = 4,500 (F)

Quick Check exercise

How do managers plan for variable overhead costs?

Fixed Overhead Variances

The process of analyzing the difference between standard and actual costs, called variance analysis, can be applied to overhead costs just as we applied it to direct materials and direct labor in the preceding parts. Direct materials and direct labor are variable costs only; they contain no fixed component. On the other hand, overhead includes relatively large amounts of fixed costs as well as some variable costs, making the analysis of overhead variances somewhat more complicated. Without flexible budgets it is difficult to assess the impact on overhead costs of activity levels that differ from the budgeted level. The purpose of overhead variance analysis is the same as that of other types of variance analysis: to determine how much actual results differ from expected outcomes and why the variance occurred.

Quick Check exercise

How does the planning of fixed overhead costs differ from the planning of variable overhead costs?

To analyze performance with regard to fixed overhead, the managerial accountant calculates fixed-overhead variances. The company's total fixed-overhead variance for January is computed below:

Actual Fixed Overhead	Birr 43,800
Fixed Overhead Applied to Work-In–Process*	35,000
Total Fixed Overhead Variance	Birr 8,800 U

*Applied Fixed OH = Predetermined Fixed OH Rate X Standard Allowed hours

= Birr 3.50 X 10,000 machine hours = Birr 35,000

Notice that overhead has been applied to work in process on the basis of 10,000 standard machine hours allowed for the actual output of January (2,500 tables) rather than on the basis of 10,500 actual hours worked. This keeps unit costs from being affected by any variations in efficiency. What caused the company to spend Birr 8,800 more than the fixed overhead applied to work-in-process based on standard machine hours allowed for actual output? To find out the reasons behind this performance, the management accountant computes the following two variances for fixed overhead:

- A fixed–overhead budget variance, and
- A fixed–overhead volume variance.

Fixed-Overhead Budget Variance

The budget variance is the difference between the actual fixed overhead costs incurred during the period and the budgeted fixed overhead costs as contained in the flexible overhead budget. This variance, used by managers to control fixed overhead costs, and that is computed by using the following formula:

Fixed OH BudgetVariance ActualVariableOHCost FlexibleBudgetFixedOHCost

XYZ Carpenters Share Company's fixed-overhead budget variance for January is, applying the formula given about, computed as follows:

Fixed OH Budget Variance ActualVariableOH Cost FlexibleBudget FixedOH Cost

Fixed OH Budget Variance $43,800 $42,000 $1,800 Unfavourab le

Fixed-Overhead Volume Variance

The volume variance is a measure of utilization of plant facilities. The variance arises whenever the standard hours allowed for the actual output of a period are different from the dominator activity level that was planned when the period began. This variance can be commuted using any one of the following two formulas:

FixedOHVolumeVariance Pre*dete*r*mine**dFOHRateDeno*min*atorsHrs S* tan*dardHrsAllowed*

Fixed OHVolumeVariance FlexibeBudget FOH Cost AppliedFOH

Let's now compute the fixed –overhead volume variance for the XYZ Carpenters Share Company's problem, using the above two formulas.

FixedOHVolumeVariance PredeterminedFOHRate DenominatorsHrs StandardHrsAllowed

FixedOHVolumeVariance $3.5012,000Hrs 10,000Hrs $7,000Unfaourable

Notice that, to compute the predetermined overhead rate for XYZ Carpenters Share Company, 12,000 machine-hours per month was taken as planned activity when the period began. Using this base, recall that, the predetermined fixed overhead rate was computed to be Birr 3.50 per machine hour as follows:

Predetermined Fixedoverheadrate

$$\frac{\text{Flexiblebudgetfixedoverheadcost}}{\text{Denominatoractivity}} \quad \frac{\$42{,}000}{12{,}000\text{Hrs}} \quad \$3.50$$

The budgeted activity level for the moth (12,000 machine hours) is used as the denominator activity in the formula for the predetermined overhead rate. These 12,000 machine hours are what we called denominator hours in the formula for volume variance. In general, the estimated total units in the base (machine hours, direct-labor hours, etc.) in the formula for the predetermined overhead rate are the denominator activity. Once an estimated activity level (denominator activity) has been chosen, it remains unchanged throughout the year even if the actual activity turns out to be different from what was estimated. The reason for not changing the denominator is to maintain stability in the amount of overhead applied to each unit of product regardless of when it is produced during the year.

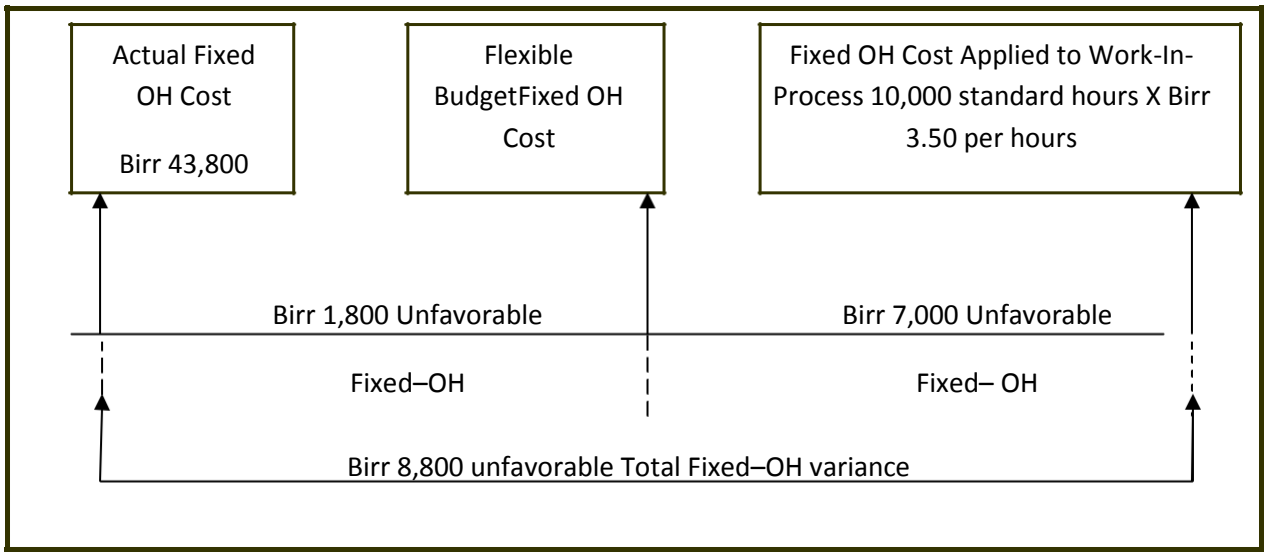
Recall that 10,000 machine hours represent the standard hours allowed for actual output of January (2,500 tables) at 4 standard machine hours per table. You can as well arrive at the same result of fixed overhead volume variance applying the second formula as shown below:

Fixed OH Volume Variance $42,000 $35,000 $7,000 Unfavourable

Now carefully observe that, as shown blow, the total fixed-overhead variance is the sum of the fixed-overhead budget and volume variances:

Fixed-Overhead Budget Variance	Birr 1,800 U
Fixed–Overhead Volume Variance	4,000 U
Total Fixed Overhead Variance	Birr 8,800 U

A summary of fixed–overhead variance is presented in the table that follows.



The fixed–Overhead variances convey useful information to management. Let's see, in the discussion that follows, at the interpretation of these variances.

Quick Check exercise

Provide one caveat that will affect whether a production-volume variance is a good measure of the economic cost of unused capacity.

Interpreting Fixed–Overhead Budget Variance

The budget variance is the real control variance for fixed overhead, because it compares actual expenditures with budgeted fixed – overhead costs. The budget variances for fixed overhead can be very useful, since they represent the difference between how much should have been spent (according to the flexible overhead budget) and how much was actually spent. An unfavorable fixed – overhead budget variance calls for an explanation of why it happened. If, for instance, the production supervisor's salary shows an unfavorable budget variance, it could be due to many reasons. The reasons could be an increase in salaries, overtime work, or another supervisor could have been hired. Proper explanation should be given as to why another supervisor was hired, if this was not included in the budget when activity for the period was planned. In brief, the fixed – overhead budget variance for XYZ Carpenters Share Company's problem is unfavorable, because the company spent more than the budgeted amount of fixed overhead. Notice that an activity level to determine budgeted fixed overhead needs no specification. This is so because all the three columns in the columnar flexible budget prepared earlier specify Birr 42,000 as budgeted fixed overhead per month.

Interpreting Fixed–Overhead Volume Variance

It has been stated earlier that the volume variance is a measure of utilization of available plant facilities. An unfavorable variance, as you have seen in our computations, means that the company operated at an activity level below that planned for the period. A favorable variance would, on the other head, mean that the company operated at an activity level greater than that planned for the period. It is important to note that the volume variance does not measure over–or under–spending. Accompany would normally incur the same Birr amount of fixed overhead cost regardless of whether the period's activity was above or below the planned (denominator) level of activity. In short, the volume variance is an activity–related variance. It is explainable only by activity and is controllable only thought activity. The following three points could summarize the fixed– overhead volume variances:

If the denominator activity (12,000 machine hours in our case) and the standard hours allowed for the actual output of the period are the same, then there is no volume variance.

If the denominator activity is greater than the standard hours allowed for actual output of the period, then the volume variance is unfavorable. This indicates an underutilization of available facilities.

If the denominator activity is less than the standard hours allowed for the actual output of the period, then the volume variance is favorable. This indicates a higher utilization of available faculties than was planned.

Example

VMOH is allocated products using direct marketing labour hours per output.

FMOH is allocated to product on a per output basis.

Budgeted amount for the period are

Direct marketing labour hours 0.25 hours per output.

Variable marketing overhead rate $20 per direct marketing labour hours.

Fixed marketing Over Head: $434,000

Output which is used as denominator level is equal to 12,000 output (Budgeted Out Put)

Actual Results for the period are:

Fixed Marketing Over Head: $420,000

Variable Marketing Over Head: $47,700

Direct Marketing Labour Hours:2,304

Actual Out Put: 10,000 units

Required: Compute the following VMOH Variance

a) Variable Marketing Over Head Variance
b) Fixed Marketing Over Head Variance
c) Prepare the necessary journal entries

Solution		
Variable Marketing OH Variance		
FBV	Actual Result – FB amount	
	45,700 – (0.25 X 20 X 10,000)	$4,300 (F)
SVV	FB amount – SB amount	
	[(0.25 X $20 X 10,000) – (12,000 X 0.25 X $20)]	$10,000 (F)
EV	(Actual quantity of inputs to be used – Budgeted quantity of inputs allowed for actual output) X Budgeted Price	
	(2,304 – (0.25 X 10,000)) X $20	$3,920 (F)
SV	Actual VOH cost per units of cost allocated base - Budgeted VOH cost per units of cost allocated base X Actual quantity	
	(45,700/2,304 - $20) X 2,304	$380 (F)
	Or 45,700 – (2,304 X $20)	$380 (F)
Fixed Marketing OH Variance		
SV=FBV	420,000 – 434,000	14,000(F)
EV & SVV	0	
PVV	Budgeted FOH – FOH allocated using budgeted input allowed for actual output units produced X Actual quantity	
	434,000 – (434,000/12,000) X 10,000	72,333 (U)
Journal Entries: For Variable Marketing OH		

	VMOH cost control AP control and other amount (To record actual cost incurred)	45,700 45,700
	WIP Control VMOH allocated (to record Variable marketing cost allocated)	50,000 50,000
	VMOH allocated VMOH EV VMOH SV VMOH Cost (To close OH amount & to record corresponding Variance)	50,000 3,920 380 45,700

3.6 CHAPTER SUMMARY

The following points are linked to the chapter's learning objectives:

A static budget is based on the level of output planned at the start of the budget period. A flexible budget is adjusted (flexed) to recognize the actual level of output achieved in the budget period. Flexible budget help managers gain more insight into the causes of variances than do static budgets.

The combination of price variances and efficiency variances helps managers gain insight into two different (but not independent) aspects of performance. Price variances focus on the difference between actual and budgeted input prices. Efficiency variances focus on the difference between actual inputs and used and the budgeted inputs allowed for the actual output.

A standard cost is a carefully predetermined cost that is based on a norm of efficiency. Standard costs can exclude past inefficiencies and they can take in to account changes expected to occur in the budget period.

Planning of both variable and fixed overhead costs involves planning to undertake only essential activities and then planning to be efficient in that undertaking. The key difference is that for variable cost planning ongoing decisions during the budget period play a larger role, whereas for fixed cost planning most key decisions have been made at the start of the period.

When flexible budget for variable overhead is developed, a spending overhead variance and an efficiency variance can be computed. The variable overhead spending variance is the difference between the actual amount of variable overhead incurred and the budgeted amount allowed for the actual quantity of variable overhead allocation base used for the actual units produced. The variable overhead efficiency variance measures the efficiency with which the allocation base is used.

The budgeted fixed overhead rate is calculated by dividing the budgeted fixed overhead costs by the denominator level of the allocation base.

3.7 SELF TEST EXERCISE

PART I: TRUE /FALSE/

Instruction: dear learners, please Write “True” if the statement is correct and “False” if the statement is incorrect.

1. The output variances refer to efficiency-whether the set objective is achieved or not and the input variances refer to effectiveness – a measure of the means by which an objective is achieved
2. Variance is the difference between actual results and budgeted data
3. All variance – favorable or unfavorable ultimately affect the operating income of the firm.
4. Static budget is prepared for ranges of volume of activity levels sometimes referred as relevant range.

5. Effective planning of variable overhead costs involves undertaking only those variable overhead activities that add value for customers using the related product or service
6. With a standard costing system, the costs of every product or service planned to be worked on during the period can be computed at the start of that period
7. Efficiency variances for direct-cost items are based on differences between actual inputs used and the budgeted inputs allowed for actual output produced.
8. There is not an efficiency variance for fixed overhead costs.

PART II: Multiple Choices

Select the best answer for each of the following multiple – choice questions:

1. The purpose of a flexible budget is to:
   A. Allow management some latitude in meeting goals.
   B. Eliminate fluctuations in production reports by ignoring variable costs.
   C. Compare actual and budgeted results at virtually any level of activity.
   D. Reduce the time to prepare the annual budget.
2. When using a flexible budget, a decrease in activity within the relevant range:
   A. Decreases variable cost per unit.
   B. Decreases total costs.
   C. Increases total fixed costs.
   D. Increases variable cost per unit.
3. A budget that is based on the actual activity of a period is known as a:
   A. Continuous budget.
   B. Flexible budget.
   C. Static budget.
   D. Master budget.
4. The fixed manufacturing overhead budget variance equals:
   A. Actual fixed manufacturing overhead cost--Applied fixed manufacturing overhead cost.
   B. Actual fixed manufacturing overhead cost--Budgeted fixed manufacturing overhead cost.
   C. Budgeted fixed manufacturing overhead cost--Applied fixed manufacturing overhead cost.

D. Actual fixed manufacturing overhead cost-- (Actual hours x Standard fixed overhead rate).

5. Which of the following variances is least significant from a standpoint of cost control?
   A. Materials price variance.
   B. Labor efficiency variance.
   C. Fixed overhead volume variance.
   D. Variable overhead spending variance.
6. If the denominator activity is less than the standard hours allowed for the actual output, one would expect that:
   A. The variable overhead efficiency variance would be unfavorable.
   B. The fixed overhead volume variance would be favorable.
   C. The fixed overhead budget variance would be unfavorable.
   D. The variable overhead efficiency variance would be favorable.
7. A primary purpose of using a standard cost system is

   A. To make things easier for managers in the production facility.

   B. To provide a distinct measure of cost control.

   C. To minimize the cost per unit of production.

   D. B and C are correct.

8. Which of the following statements regarding standard cost systems is true?

   A. Favorable variances are not necessarily good variances.

   B. Managers will investigate all variances from standard.

   C. The production supervisor is generally responsible for material price variances.

   D. Standard costs cannot be used for planning purposes since costs normally change in the future.

9. The material price variance (computed at point of purchase) is

A. The difference between the actual cost of material purchased and the standard cost of material purchased.

B. The difference between the actual cost of material purchased and the standard cost of material used.

C. Primarily the responsibility of the production manager.

D. Both A and C.

10. If actual direct labor hours (DLHs) are less than standard direct labor hours allowed and overhead is applied on a DLH basis, a(n)

A. Favorable variable overhead spending variance exists.

B. Favorable variable overhead efficiency variance exists.

C. Favorable volume variance exists.

D. Unfavorable volume variance exists.

11. A variable overhead spending variance is caused by

A. Using more or fewer actual hours than the standard hours allowed for the production achieved.

B. Paying a higher/lower average actual overhead price per unit of the activity base than the standard price allowed per unit of the activity base.

C. Larger/smaller waste and shrinkage associated with the resources involved than expected.

D. Both B and C are causes.

PART IV: WORK OUT

Work-out the following questions according to the directions beside each question.

1. Brabham Enterprises manufactures tires for the Formula I motor racing circuit. For August 2012, it budgeted to manufacture and sell 3,000 tires at a variable cost of $74 per tire and total fixed costs of $54,000. The budgeted selling price was $110 per tire. Actual results in August 2012 were 2,800 tires manufactured and sold at a selling price of $112 per tire. The actual total variable costs were $229,600, and the actual total fixed costs were $50,000.

Required:

   1. Prepare a performance report that uses a flexible budget and a static budget.
   2. Comment on the results in requirement 1.

2. Tuscany Statuary manufactures bust statues of famous historical figures. All statues are the same size. Each unit requires the same amount of resources. The following information is from the static budget for 2011:

Expected production and sales	6,000 units
Direct materials	72,000 pounds
Direct manufacturing labor	21,000 hours
Total fixed costs	$1,200,000

Standard quantities, standard prices, and standard unit costs follow for direct materials and direct manufacturing labor:

	Standard Quantity	Standard Price	Standard Unit Cost
Direct materials	12 pounds	$10 per pound	$120
Direct manufacturing labor	3.5 hours	$50 per hour	$175

During 2011, actual number of units produced and sold was 5,500. Actual cost of direct materials used was $668,800, based on 70,400 pounds purchased at $9.50 per pound. Direct manufacturing labor-hours actually used were 18,500, at the rate of $51.50 per hour. As a result, actual direct

manufacturing labor costs were $952,750. Actual fixed costs were $1,180,000. There were no beginning or ending inventories.

Required:

1. Calculate the sales-volume variance and flexible-budget variance for operating income.

2. Compute price and efficiency variances for direct materials and direct manufacturing labor

Chapter: 4 CHAPTER MEASURING YIELD AND MIX VARIANCE

4.0. Learning Objectives:

After studying this chapter, you should be able to:

- Distinguish between variance analysis procedures where inputs cannot be substituted for one another and those where inputs can be substituted
- Understand how direct materials yield and mix variances highlight trade-offs among material inputs
- Explain direct manufacturing labour yield and mix variance
- Describe the insight gained from dividing the sales volume variance into the sales mix and sales quantity variance
- Explain how market size and market share variances provide different explanations for a sales quantity variance
- Explain how controllability relates to responsibility accounting

4.1 Introduction

Dear Learners! Comparing actual results with budgets can help managers evaluate operations and focus on areas that deserve more attention. In the previous we have illustrated various uses of variance information relating to direct materials, direct manufacturing labor, and manufacturing overhead. While Chapter 4 focused on a single input in each cost category (for example, only one direct material), this chapter considers multiple inputs in each cost category (for example, many types of direct materials). Also, we discuss revenue and sales mix and quantity analysis for companies with multiple products.

4.2 Input Variances

Here we focus on variance analysis for inputs in manufacturing organizations. Manufacturing processes often require that a number of different direct materials and different direct manufacturing labor skills be combined to obtain a unit of finished product. In the case of some

materials and labor skills, this combination must be exact. For example, the manager of a Siemens plant that assembles laptop computers prespecifies the type of chip to be used in each computer. Substituting a Pentium®III for a Pentium®IV chips will alter the final product. We refer to these materials as non- substitutable materials. In the case of other materials, a manufacturer has some leeway in combining the materials. For example, to manufacture fertilizers, Cargill Fertilizers can combine materials (for example, elemental phosphorus and acids) in varying proportions. Elemental phosphorus and acids are substitutable materials.

When inputs are substitutable, mix refers to the relative proportion or combination of the different inputs used within an input category such as direct materials or direct manufacturing labour to produce a quantity of finished output. Yield refers to the quantity of finished output units produced from a budgeted or standard mix of inputs within an input category. Yield and mix variances are useful when examining direct materials and direct-labor inputs. Consider, for example, the production of ice- cream. Ice-creams contain multiple material ingredients. Walls' Nut 'n Crunch ice- cream, for example, has milk, cream, cocoa, chocolate, caramel and different kinds of nuts. Managing the total quantity and mix of ingredients is essential to making high quality ice-cream at a competitive cost. Direct materials yield and mix variances help managers to achieve these goals.

Dear Learners! Recall from the previous part that a variance is the difference between an actual result and a budgeted amount, when that budgeted amount is a financial variable reported by the accounting system. Budgeted figures discussed in this chapter can be obtained from:

Internally generated *actual costs* from the most recent accounting period, sometimes adjusted for expected improvement

Internally generated *standard costs* based on best performance standards or currently attainable standards

Externally generated *target cost* numbers based on an analysis of the cost structures of the leading competitors in an industry.

4.2.1 Direct Material Mix & Yield Variance

When we initially examined materials and labor variances in Chapter 4, we saw that managers sometimes make trade-offs between price and efficiency variances. For example, an orange-juice bottler may use oranges whose juice content is lower than budgeted if their price is significantly lower than the price of oranges with the budgeted juice content. The yield and mix variances calculated in this section provide additional insight into the effect that yield and mix factors have on operating income. Yield and mix variances divide the efficiency variance calculated in Chapter 4; hence, we start by reviewing efficiency and price variances.

Material Yield Variance: In any manufacturing process, some unavoidable loss always takes place. Thus if the input is 100, output may be 95, 5 units being normal or unavoidable loss. The normal loss is always anticipated and taken into consideration while determining the standard quantity. Yield variance arises when the actual loss is more or less than the normal loss.

Its formula is as follows

Direct Material Yield variance =	(	Actual Quantity of all direct Material input used	-	Budgeted total Quantity of all DM inputs allowed	X	Budgeted DM input %age	Budgeted X price of DM input	)

Direct Materials Mix variance

Material Mix Variance: In case of several products, two or more types of raw materials are mixed to produce the final product. In such cases, standard proportion of mixture is decided in advance. For example, in manufacturing one unit of product 'P', material A and B may have to be mixed in a standard proportion of 3:2. This is called as a standard mix. However, when the actual production begins, the actual proportion of mix may have to be changed due to several reasons like non-availability of a particular material etc.

The DM mix variance is defined as the portion of the material usage variance which is due to the difference between standard and actual composition of materials.

Its formula is as follows:

$$\text{Direct Material Mix variance} = \left(\begin{array}{l} \text{Actual Quantity of all direct Material input \%age} \\ - \\ \text{Budgeted DM input \%age} \end{array} \right) \times \begin{array}{l} \text{Actual Quantity of all direct Material input used} \\ \times \\ \text{Budgeted price of DM input} \end{array}$$

Quick Check exercise

Distinguish between total direct materials yield and mix variances.
Direct materials yield and mix variances are particularly useful when materials are substitutable.' Do you agree? Explain.
Name three sources of the standards used in the total direct materials yield and mix variances.
Changes in the mix of direct materials used from the budgeted mix always hurt yield.' Do you agree?

Example: Consider a specific example of multiple direct materials inputs and a single product output. Aliya Ltd makes cider. To produce cider of the desired consistency, colour and taste, Aliya mixes three types of apples grown in three different regions: Golden Delicious from Brittany, British Coxes from Kent, and Jonagold from Italy. Aliya's production standards require 1.6 tones of apples to produce 1 tons of cider, with 50% of the apples being Golden Delicious, 30% British Coxes, and 20% Jonagold. The direct materials input standards to produce 1 tons of cider are:

The direct materials input standards to produce one tones of ketch up are

0.8 (50% X 1.6) tones of Golden Delicious at $70 per ton = $ 56.00 (0.5 X 70 X1.6)

0.48 (30% X 1.6) tone of British Coxes at $ 80 per ton = $ 38.40

0.32 (20% X 1.6) tone of Jonagold at $ 90 per ton = $ 28.80

Total Standard cost of 1.6 tomatoes……...= $ 123.20

Budgeted cost per ton of tomatoes is $\frac{\$ 123.20}{1.6 \textit{ tone}}$ $77

Because Aliya uses fresh apples to make cider, no stocks of apples are kept. Purchases are made as needed, so all price variances relate to apples purchased and used. Actual results for June 2008 show that a total of 6500 tones of apples were used to produce 4000 tons of cider:

3,250 tons of Golden Delicious at actual cost of $ 70 per ton = $277,500

2,273 tone of British Coxes at actual cost of $ 82 per ton = $186,550

975 tone Jonagold at actual cost of $ 96 per ton = $93,600

6500 tons of tomatoes	$507,650
Standard cost of 4,000 tones of cider at $ 123.20 per ton	492,800
Total variance to be explained	$14, 850 U

Given the standard ratio of 1.6 tones of apples to 1 ton of cider, 6,400 tones of apples should be used to produce 4,000 tons of cider. At the standard mix, the quantities of each type of apple required are:

Golden Delicious 0.50 x 6,400 = 3,200 tones

British Coxes 0.30 x 6,400 = 1,920 tones

Jonagold 0.20 x 6,400 = 1,280 tones

Required: From the above data compute

FBV of direct Material

Price Variance of direct Material

Efficiency Variance of Direct Material (DMMV + DMYV)

Direct Material Mix Variance (DMMV)

Direct Material Yield variance (DMYV)

Solution:

4) DM Mix Variance

L = (50% - 50%) X 6500 X $70 = 0

C = (35% - 30%) X 6500 X $80 = 26,000 (U)

F = (15% - 20%) X 6500X $90 = 29,250 (F)

Total Material Mix Variance = $3250 (F)

5) Direct Material Yield Variance

C = (6500 – 6400) X 30% x $80 = $2400(U)

F = (6500 – 6400) X 20% x $90 = $1800(U)

Total DM yield variance = $7700(U)

1) Flexible budget variance

Actual X actual	Actual X	Budgeted	budgeted
Input price	input	price	input allowed X budgeted price For actual output

Total Flexible Budget Variance

= $3,500 /U/ + $32,950/U/ + $21,600 /F/ = $14,850 /U/

2) Price Variance

L =($70–70)X3250= 0

C=($82–80) X2275= $ 4550 /U/

F=($96–90)X975 = $ 5850 /U/

$10400 /U/

3) Efficiency Variance

L = (3250 - 0.8 (4000) X $ 70 = $ 3500 /U/

C = (2275 - 0.48 (4000) X $ 80 = $ 28,400 /U/

F = (975 - 0.32 (4000) X $ 90 = $ 27,450 /F/

$ 4450 /U/

FBV=PV+EV

= $ 10 400 /U/ + $ 4450 /U/ = $14,850 /U/

Mix Variance Interpretation

The favorable total DM mix variance occurs because the average budgeted cost per ton of tomatoes in the actual mix is less than the average budgeted cost per ton tomatoes in the budget mix. i.e. 497,250

6,500

Less than 500,500 = (76.5 – 77) X 6,500 = 3,250 |F|

6500

Yield variance interpretation

The total DM yield variance is unfavorable, because the Delpino Corporation uses 6500 tones if tomatoes rather than the 6400 tones, i.e. should have been used to produce 4000 tons of ketch up. The unfavorable yield variance represents the budgeted cost of using 100 more tones of tomatoes, (6,500 – 6400) x 77= 7700(U)

4.2.2 Direct Manufacturing Labour yield & Mix Variance

Direct Mfg Labour Yield Variance

This variance is quite similar to material yield variance. This variance also reveals the effect on labour cost of actual output or yield being more or less than the standard yield. It also indicates the difference between the actual output and the standard output based on actual hours. In other

words, a comparison is made between the actual production achieved and the production that should have been achieved in actual number of working hours. The variance will be favorable is the actual output achieved is more than the standard output.

Its formula is as follows:

$$\text{Direct Mfg Labour Yield} = \left[\text{Actual total Quantity of All direct} - \text{Budgeted total Quantity of all Direct mfg labour inputs} \times \text{Budgeted direct Mfg labour input}\right] \times \text{Budgeted Price of direct Mfg}$$

Direct Manufacturing Labour Mix Variance *or* Gang Composition Variance

This variance is similar to the material mix variance and is computed in the same manner. In doing a particular job, there may be a particular combination of labour force, which may consist of skilled, semi skilled and unskilled workers. However due to some practical difficulties, this composition may have to be changed. How much is the loss caused due to this change or how much is the gain due to this change is indicated by this variance.

Its formula is as follows:

$$\text{Direct Mfg Labor Mix Variance for} = \left[\text{Actual direct actual Mfg labor Input} - \text{Budgeted direct Mfg labour input Mix \% age}\right] \times \text{Actual total quantity of all mfg labor input} \times \text{Budgeted price of direct mfg labor input}$$

Quick Check exercise

How might managers use information about direct-labor yield and mix variances in improving the performance of a business?
Give an example of an input other than direct materials and direct labor where calculating yield and mix variances might be useful. Explain your reasoning briefly. The manager of a highly automated plant that assembles desktop computers Commented, 'Yield and mix variance information is irrelevant to my cost management decisions.' Give two

Example: RAM Corporation has three grades of direct mfg labor:

Grade 1, Grade 2 & Grade 3

Budgeted cost for the period in as follows:

3000 hrs of grade 3 labor at $24 per hour……. $72,000

2100hrs of grade 2 labor at $ 16 per hour……..….. $33,600

900 hrs of grade 1 labor at $12 per hour…….. $10,800

6000 Total hours $116,400

Actual results for the period show that the work was completed in 5,900 hours.

3,245 hours of grade 3 labor at $23 per hour……$74,635

1,770 hours of grade 2 labor at $18 per hour……$31,860

885 hours of grade 1 labor at $13 per hour……$11,505

5900 Total hours $118,000

(2) - price variance of direct labor

(3) - efficiency variance of direct labor

(4) - Direct labor mix variance

(5) - Direct labor yield variance

SOLUTION:

(1) Flexible budget Variance of Direct Labor

G3 = $74,635 -$72,000 = $2,365 (U)

G2 = $31,830 -$33,000 = $1,740 (F)

G1 = $11,505 -$10,800 = $705 (U)

Total FBV $1,600(U)

(2) Price Variance of Direct Labor

G3 = ($23 -$24) X 3,245 = $3,245 (F)

G2 = ($18 -$16) X 1,770= $3,540 (U)

G1 = ($13 -$12) X 885 = $885 (U)

Total PV $1,180(U)

(3) Efficiency Variance of Direct Labor

G3 = (3,245 – 3,200) X $24 = $5,880 (U)

G2 = (1,770 – 2,100) X $16= $5,280 (F)

G1 = (885 – 900) X$12 = $180 (F)

Total EV $420(U)

(4) Direct Labor Mix Variance

G3= (0.55 – 0.5) X 5900 x $24 = $7080(U)

G2= (0.3 - 0.35) X 5900 x $16 = $4720(F)

G1= (0.15 – 0.15) X 5900 x $12 = $ 0

Total DL Mix Variance = $2,360 (U)

(5) Direct manufacturing labor yield variance

G3 = (5,900 – 6000) x 0.5 x $24 = $1,200(F)

G2 = (5900 – 6000) x 0.35 x $16 =$560(F)

G1 = (5900 – 6000) x 0.15 x $12 =$180(F)

D. mfg labor yield variance= $1940 (F)

INTERPRETATION

The unfavorable mix variance occurs because a greater proportion of works was done by the more costly grade three labors. As a result of the change in mix, the average budgeted cost per direct mfg labor hour in the actual mix was higher than the average budgeted cost per direct mfg labor

hour in the budget mix $\frac{116,820}{5900}$ $\frac{114,460}{5900}$ (19.8 – 19.4) X 5,900 = $2360

The favorable yield variance indicates that the work was completed faster in 5,900 actual total hours compared with 6000 budgeted total hours. Perhaps this result is due to the extra time spent by grade 3 labor.

4.3 Sales and Marketing Variance

4.3.1 Sales Variance

Sales volume variance

Volume refers to the number of physical units.

SVV refers the portion of the sales value variance which is due to the change between the actual volume and standard volume sales.

Its formula is as follows:

SVV = (Actual Quantity – Budgeted Quantity) X Standard Price

Quick Check exercise

How can the sales-volume variance be decomposed further to obtain useful information?

4.3.2 Sales Quantity and Mix Variance

4.3.2.1 Sales Mix Variance

When a company is selling more than one types of products, a budget will be prepared to show the budgeted sales of each product. If actual sales of different products are not the same proportion as budgeted, a sales mix variance will arise. Sales mix variance is "the portion of sales volume variance which is due to the difference between the standard and the actual inter relationship of the quantity of each product group of which sales are composed."

Its formula is as follows:

Sales mix		Actual unit			Actual sales		Budgeted			Budgeted
Variance	=	of all	X		Mix % age	__	Sales mix	X		Selling

Sales Quantity Variance

The sales volume variance in units is the difference between the actual units sold and the budgeted quantity. This variance in units can be valued in one of three ways: in terms of standard revenue, standard gross margin or standard contribution margin.

Its formula is as follows:

Sales quantity variance	=		Actual unit		Budgeted			Budgeted		Budgeted
			Of all	__	Unit of all		X	Sales mix	X	Selling

Quick Check exercise

Explain why a favorable sales-quantity variance occurs.

Example: Global air operator flights between New York & London. It has three class of service.

First class, business class & economics class. Unit volume is measured in terms of a round trip ticket.

Budgeted amount for the period are as follows:

	USP	Unit volume	Mix	Revenue
First class	$ 3200	1,000	5 %	3.2 m
Business class	$ 2400	3,000	15 %	7.2 m
Economic class	$ 900	16,000	80 %	14.4 m
Total		20,000	100%	$ 24.8 m

Actual results for the period are as follows:

	USP	Unit volume	Mix	Revenue
First class	2,600	2,400	10%	$6.24m
Business class	1,600	6,000	25%	$9.6m
Economic class	70	15,600	65%	$10.92m
Total		24,000	100%	$26.76m

Required

1) Static budget variance = $1.96m (F)

2) FBV = 9.36m (U)

SVV = 11.32m (U)

3) Sales mix variance

4) Sales quantity

variance Solution

3) FC = 24,000 (10% - 5%) X 3,200 = 3.84m (F)

BC = 24,000 (25% - 15%) X 2,400 = 5.76m (F)

EC = 24,000 (65% - 80%) X 9,00 = 3.24m (U)

$ 6.36m (F)

Interpretation

A favorable sales mix variances arises at the individual product level when the actual sales mix %age exceeds the budgeted sales mix % age (first class & BC). In constant economic class has an unfavorable variance.

4) Sales quantity variance (SQV)

FC = (24,000 – 20,000) X 5% x $3,200 = $ 0.64m (F)

BC = (24,000 – 20,000) X 15% x $2400 = $1.44m (F)

EC = (24,000 – 20,000) X 80% x $900 = $ 2.88m

$4.96m (F)

Interprétation

This variance is favorable when the actual unit of product sold exceeds the budget units of product sold. Global sold 4000 more round trip ticket than was budgeted. Hence, its sales quantity variance for revenue is favorable.

4.3.3 Marketing Variances
Market Size Variance

The market-size variance is the difference in budgeted contribution margin at budgeted market share caused solely by actual market size in units being different from budgeted market size in units.

Budgeted average

Selling price

Per unit

$$\text{Market size variance in revenue} = \left[\frac{\text{Actual Market}}{} - \frac{\text{Budgeted Market}}{}\right] \times \frac{\text{Budget}}{\text{Market}} \times$$

Market Share Variance

The market-share variance is the difference in budgeted contribution margin for actual market size in units caused solely by actual market share being different from budgeted market share.

$$\text{Market size variance for revenue} = \frac{\text{Actual}}{\text{Market}} \times \left[\frac{\text{Actual}}{\text{Market}} - \frac{\text{Budget}}{\text{Market}}\right] \times \frac{\text{Budgeted average}}{\text{Selling price}}$$

Quick Check exercise

Distinguish between a market-size variance and a market-share variance.

Example: Assume that the budgeted and actual data of the industry for the three from New York to London route in the period is as follows:

	Budgeted industry Volume for the period	Actual industry volume for the period
FC – costly	1,500	3,000
BC – medium	6,000	9,000
EC – lower	32,500	38,000
Total	40,000	50,000

Compute: 1) Market Size Variance

Market Share Variance

Solution

Average

Budgeted = 3,200 x 0.05 + 2400 x 0.15 + 900 x 0.8

USP = $1,240

Market = (50,000 – 40,000) X 20,000 X 1240 = 6.2m (F)

Size variance 40,000

$$\text{Market Share variance} = \left[\frac{24{,}000}{50{,}000} - \frac{20{,}000}{40{,}000}\right] \times 50{,}000 \times 1240 = 1.24\text{m (U)}$$

INTERPRETATION

$6.2m market sizes variance for revenue is favorable because it is the additional revenue as a result of the 25% increase in market size.

$1.24m unfavorable variance highlights the revenue impact of these two percentage point decline in market share

4.4 CHAPTER SUMMERY

When inputs such as three direct materials, are not substitutes, price and efficiency variances individually calculated for each material typically provide the information necessary for decisions. In the case of substitutable inputs, however, various combinations of inputs can be used to produce the same output; further splitting the efficiency variance into yield and mix variances provides additional information.

Many products use multiple direct materials that can be substituted for one another. In these cases, direct materials efficiency can come from two sources: (1) using fewer inputs of one or more of the materials, and (2) using a cheaper mix of materials to produce output. The total direct

materials yield and mix variances divide the total direct materials efficiency variance into two components, with the yield variance focusing on the total inputs used and the mix variance evaluating how the inputs are combined.

Multiple direct-labor inputs that are substitutes for one another are often used to manufacture a product or provide a service. The total direct manufacturing labour yield and mix variances indicate the sources of direct manufacturing labour efficiency. A favorable total direct manufacturing labour yield variance results when fewer total direct manufacturing labour-hours are used to produce a given quantity of product. A favorable total direct manufacturing labour mix variance results when a cheaper mix of direct manufacturing labour inputs is used to produce the actual quantity of product.

A sales-volume variance can occur because of (a) a change in the actual unit sales from the budgeted unit sales (a sales-quantity variance), and (b) a change in the actual sales mix from the budgeted sales mix (a sales-mix variance). Sales quantity and sales-mix variances can be calculated for companies selling multiple products or services or the same product or service in multiple markets.

The sales-quantity variance can occur because of (a) a change in the actual market size in units from that budgeted (the market-size variance), and (b) a change in the actual share of the market compared to its budgeted share (the market-share variance).

4.5 SELF TEST EXERCISE

PART I- Fill in the Blank Spaces

Instruction, Dear Learners, please fill in the blank spaces with appropriate words or phrases

i. _____ is based on the level of output planned at the start of the budget period.
ii. _____ Variances which arise from change in input prices from the expected Prices (budgeted prices.)
iii. _____ Variances which arise from use of unit quantities.
iv. The price and efficiency variances together are sometimes referred as _____

v. The flexible-budget variance pertaining to revenues is often called _____
vi. The _____ is the difference between budgeted fixed overhead and the fixed overhead allocated on the basis of the budgeted quantity of the fixed overhead allocation base allowed for the actual output produced
vii. _____ is the difference between the actual quantity of input used (such as yards of cloth of direct materials) and the budgeted quantity of input that should have been used, multiplied by the budgeted price.
viii. The _____ measures the difference between the actual variable overhead costs and the flexible-budget variable overhead costs.
ix. The _____ is the difference between the actual amount of variable overhead incurred and the budgeted amount allowed for the actual quantity of the variable overhead allocation base used for the actual output units produced
x. The _____ is the difference between actual fixed overhead costs and the fixed overhead costs in the flexible-budget.
xi. _____ refers to the relative proportion or combination of the different inputs used within an input category such as direct materials or direct manufacturing labor to produce a quantity of finished output.
xii. _____ refers to the quantity of finished output units produced from a budgeted or standard mix of inputs within an input category. Yield and mix variances are useful when examining direct materials and direct-labor inputs.
xiii. A _____ is a hypothetical unit with weights related to the individual products of the company.
xiv. The _____ is the difference between the budgeted amount based on the actual market size in units and the budgeted market share, and (2) the static-budget amount based on the budgeted market size in units and the budgeted market share
xv. The _____ is the difference between) the budgeted amount for the actual sales mix, and (2) the budgeted amount if the budgeted sales mix had been unchanged
xvi. The _____ is the difference between two amounts: (1) the budgeted amount at budgeted mix based on the actual market size in units and the actual market share, and (2) the budgeted amount at budgeted mix based on actual market size in units and the budgeted market share

xvii. The _____ focuses on total inputs used and the _____ focusing on how the inputs are combined.

PART II: WORK OUT

Work-out the following questions according to the directions beside each question.

Q1. The Scent makers company produces perfume. To make this perfume, scent makers uses three different types of fluids. Dycone, Cycone and Bycone are used in standard proportions of 4/10, 3/10 and 3/10 and their standard costs are Bir.6.00, Bir.3.50 and Bir.2.50 per unit; respectively. The chief engineer reported that the past few months the standard yield has been 80% on 100 pints of Mix. The company maintains a policy of not carrying any direct materials, as inventory storage space is costly. Last week the company produced 75,000 pints of perfume at a total direct material cost of Bir.449,500. The actual number of pints used and costs per unit for the three fluids are as follows;

Direct materials	Actual pints	cost per pint
Dycone	45,000	Bir.5.50
Cycone	35,000	Bir.4.20
Bycone	20,000	Bir.2.75

Required:

1. Compute the total direct material price and efficiency variances for per fume made in the last week
2. Compute the total direct materials yield and mix variances for the last week.
3. Explain the significance of the price, yield and mix variance form management Required

Q2. X Ltd had bu*9dgeted the following sale for the month of August, 2003.

Product A: 800 units @ Bir.100.00 per unit

Product B: 700 units @ Birr. 200.00 per unit

The actual sale for the month was as follows;

Product A: 900 units @ Bir.110.00 per unit

Product B: 800 units @180.00 per unit

The cost per unit of products A and B were Bir.80.00 and Bir.170.00 respectively

Required:

Computation of the different variance to explain the difference between the budgeted and actual profits.

Chapter: 5 CHAPTER DECISION MAKING AND RELEVANT INFORMATION

5.0 Learning Objectives

Describe six steps in the decision- making process and the management accountant's role in that process.

Explain the relation between quantitative and qualitative analyses in decision making

Discriminate between relevant ad irrelevant information for making decisions.

Analyze data by the contribution approach to support a decision for accepting or rejecting special sales order.

Analyze data by the relevant-information approach to support a decision for adding or dropping a product line.

State a general rule for distinguishing between relevant and irrelevant costs in decision-making process.

Identify qualitative and quantitative factors to be considered in a make or buy decision.

Prepare an analysis to support a decision to make or buy certain parts or products.

Identify sunk costs and explain why they are not relevant in decision whether to keep or replace equipment.

5.1 Introduction

Hello Dear learners! In this chapter you will learn about Decision making & relevant information. WE have discussed various cost concepts in the preceding duties. Not all cost concepts/costs are relevant in decision-making. The purpose of this chapter is to identify and analyses *relevant costs* for making decisions. The decisions considered here are those decisions, which involve alternative-choices. *Decision-making* is one of the basic functions of a manager. Managers are constantly faced with problems of deciding what products to sell and what prices to charge, what producing methods to use, whether to make or buy component parts, what channels of distribution to use, whether to accept or reject a onetime-only special orders at

special prices, in sourcing or outsourcing products or services, replacing or keeping equipment, and so forth. *Decision making* is a fundamental part of management decision about the acquisition of equipment, mix of product, method of production and pricing of product and services confront managers in all types of organizations. Moreover, decision-making is a difficult and complex task. The difficulty of this is usually increased by the existence of not just one or two but numerous courses of action that might be taken in any given situation facing a firm. In this chapter, we focus our attention on some of the following important decisions:

- Pricing special offer
- Buy or make decision
- Changing product mix
- Adding or dropping product line
- Dropping a division
- Determination of the optimum level of production.

5.1.1 Identifying Relevance and Other Concepts in Decision Making

Decision-making is a process of choosing among a set of alternative courses of action with a view to attain the firm's objective. A manager should take the following steps:

*Step 1: she/*he should recognize the problems for which decisions have to be made;

*Step 2: she/*he should identify the alternative ways of solving the problems;

*Step 3: she/*he should evaluate the alternatives by analyzing their costs and benefits; and

*Step 4: she/*he should adopt the most profitable courses of action based on his evaluation.

Decision-making is a future-oriented activity; it involves forecasting and planning. What has happened in the past is only of historical value. The function of decision-making is to choose alternatives for the future.

There are two prerequisites for making efficient and effective decisions.

1. All possible alternatives should be carefully delineated. A manager may choose a best alternative from among the alternatives *considered* by her/him; but she/he may fail to consider some other available alternative, which may be better than the chosen

alternative. This will involve an opportunity cost for the firm for the alternative not considered.

2. The objective should be correctly set. A wrong objective can lead to the adoption of undesirable and unprofitable courses of action.

Cost data are the most crucial quantitative factors needed for making decisions, that is, in decision-making; *cost* is always a key factor. A distinction between relevant and irrelevant cost data should be drawn. *A cost is relevant if it is pertinent to the decision under consideration.* A cost which varies as a consequence of the decision is a *relevant cost*. Variable costs, for example, invariably are the relevant costs since they increase or decrease when a decision is made. Those costs which do not change as a result of decision are irrelevant costs. Fixed costs, for instance, do not change if activity (volume) is expanded within the normal capacity range. They are irrelevant costs in such a situation. One should not conclude that variable costs are always relevant costs and fixed costs irrelevant. Fixed costs will become relevant costs if they change when a decision is made. The important criterion is: Whether or not cost changes as a consequence of the decision. from the decision framework. The purpose of this chapter is to acquire these tools and to show their application in a wide range of decision-making situations. Relevant cost includes concepts such as differential cost and marginal cost and contribution approach. Differential cost is the difference of costs of two alternatives, while marginal cost in cost accounting is equal to variable cost. In the following pages, the applications or these cost concepts for making decisions are illustrated.

Mangers in all types of organizations are constantly confronted with problems of deciding what equipment to acquire, what products to sell and in what mix, what methods of production to employ, whether to make or buy component parts, what prices to charge for products and service, what channels of distribution to use, whether to accept special orders at special prices, among other things. Decision-making is often a difficult task that is complicated by the existence of numerous alternatives and massive amounts of data, only some of which may be relevant. In brief, the need for a decision arises in business because managers are faced with a problem and alternative courses of action are available in solving that problem. In deciding which option to choose from the available alternatives, managers will need all the information which is relevant to the decision under consideration and must have some criterion by which to choose the best

alternative. Thus, making correct decisions is one of the most important tasks of a successful manager.

As stated before, volumes of data, irrelevant data, incomplete information, and unlimited array of alternatives may complicate the decision process. Every decision involves choosing from among at least two alternatives. In making a decision, the costs and benefits of one alternative must be compared to the costs and benefits of other alternatives. Distinguishing between relevant and irrelevant costs and benefits is critical for two reasons. First, irrelevant data can be ignored and need not be analyzed. Thus, it can save decision makers tremendous amount of time and effort. Second, bad decisions can easily result from erroneously including irrelevant cost and benefit data when alternatives are being analyzed. To be successful in a decision-making, therefore, mangers must be able to acquaint with the difference between relevant and irrelevant data and must be able to correctly use only the relevant data in analyzing alternatives. Thus, in making decisions, mangers must be able to eliminate or take no notice of irrelevant costs and benefits from the analysis. The purpose of this chapter is to develop these skills by illustrating their use in a wide range of decision-making situations.

Unique decisions arise infrequently or only once. Compiling data for unique decisions, such as adding or dropping a product line, usually requires a special analysis by the managerial accountant. The relevant information often will be found in many diverse places in the organization's overall information system. However, information relevant to many unique decisions is harder to generate. The managerial accountant typically will have to give more thought to deciding which data are relevant, and will have less historical data available upon which to base predications. In contrast, repetitive (routine) decisions are made over and over again, at either regular or irregular intervals. Cost predications relevant to repetitive decisions typically can draw on large amount of historical data. Since the decisions have been made repeatedly in the past, the data from those decisions should be readily available.

Quick Check exercise
Define relevant costs. Why are historical costs irrelevant?

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

5.2 The Accountant Role in Special Decisions

Working with managers to make decisions is one of the main functions of the cost and management accountant and an important driving force or thrust of this chapter. The use of accounting information for decision-making has been a consistent theme in earlier chapters. The accountant is responsible for seeing that relevant, reliable, timely and understandable data are available to guide management in its decisions, particularly these decisions relating to special, non-routine situations. Reliance by management on irrelevant data can lead to incorrect decisions, reduced profitability, and inability to meet stated objectives.

The cost and managerial accountant's role in the decision-making process is to gather, summarize, analyze, and provide relevant information to the mangers who make the ultimate decisions. Production mangers typically make the decisions about alternative production processes and schedules, marketing managers make pricing decisions, and finance professionals usually are involved in decisions about major acquisitions of equipment, financing decisions, liquidity and dividend policy decisions. All of these managers require information pertinent to their decisions. The cost and managerial accountant's role is, therefore, to provide information relevant to the decisions faced by mangers throughout the organization. Consequently, the cost and managerial accountant needs to be versed with a good grasp of the decisions faced by those mangers that make the final decisions. The following steps basically characterize the decision-making process:

1. *Identify, define, and clarify the decision problem*

Before making decisions of any type, the problem needs to be identified, defined, and clarified in more specific terms. Considerable managerial skill is required to define a decision problem in terms that can be addressed effectively. Notice that this is the most important phase of the decision making process as all other steps in the process depends on this phase. Incorrectly

defined problems could result in wastage of time and resources. That is why it is usually being said, “Defining a problem correctly is half a solution”. Sometimes the decision problem is clear, but it is seldom clear and unambiguous.

1. *Specify the criterion*

Once a decision problem has been clarified, the manager should specify the criterion upon which a decision will be made. Is it to *maximize profit, increase market share, minimize cost, or improve public service*? Sometimes the objectives are in conflict, as in a decision problem where production cost is to be minimized but product quality must be maintained. In such cases, one objective is specified as the decision criterion, for example, cost minimization. The other objective is established as a constraint, for example, product quality must not fall below one defective part in 1,000 manufactured units.

2. *Identify the possible alternatives*

A decision involves selecting between two or more alternatives. Thus, determining the possible alternative courses of action is a critical and vital step in the decision-making process. If, for instance, a machine breaks down, the alternative courses of action could be to repair the machine or replace it through acquisition or lease.

3. *Develop a decision model*

A decision model is a simplified representation of the choice problem. Unnecessary details are stripped away, and the most important elements of the problem are highlighted. Thus, the decision model brings together the elements listed above: the criterion, the constraints, and the alternatives.

4. *Collect the data*

Information could be subjective or objective, internal or external to an organization, historical (past) or future (expected). Selecting data pertinent to decisions is one of the most important roles of a managerial accountant in an Organization. Notice that every piece of data collected

may not be relevant and decisions should, therefore, be based only on the relevant data. Collection of data is primarily the responsibility of the managerial accountant.

5. *Make a Decision*

After each possible alternative is evaluated in terms of its costs and benefits, the best alternative is selected and implemented. In brief, on the basis of the decision model formulated and the pertinent data collected, the appropriate manger makes a decision. Decision problems involving accounting data are typically expressed or specified in *quantitative (numerical)* terms. The criteria in such problems usually include such objectives as profit maximization, cost minimization, increasing market share, reduction of time and wastage of resources, just to mention. The crux of the argument is that, when mangers make the ultimate decisions, the qualitative aspects that characterize the alternatives can be just as important as the quantitative measures. *Qualitative characteristics* are those factors in a decision problem that cannot be expressed easily and effectively in numerical or quantitative terms. For example, if a company eliminated one of its branches, the quantitative analysis could indicate that the company's profit

would be maximized. In making this decision, however, management of the company should consider such qualitative issues as the effect of the closing on the morale of its remaining employees working in the other branches. Another qualitative issue that must be considered is the loss of control that occurs if a component that has been produced internally is given, as it is found to be profitable on purely quantitative terms, to an outside subcontractor.

To clarify what is at stake in such qualitative analysis, quantitative analysis can allow the decision maker to put a "price" on the sum total of the qualitative characteristics. For example, returning to our example with regard to the elimination of a branch, the quantitative analysis shows that eliminating the branch will increases annual profit by Birr 45,000. However, the qualitative considerations favor the option of continuing the branch. How important are these qualitative considerations to the top management? If they decide to continue the branch, the qualitative considerations must be worth at least Birr 45,000 to them. Weighing the quantitative and qualitative considerations in making decisions is the essence of management. The skill, experience, judgment, and ethical standards of mangers all come to bear on such difficult choices. Qualitative factors may be vital in many cases. Accountants, however, usually strive to

express many decision factors in quantitative terms so as to reduce the number of qualitative factors for they are subject to personal judgment. Though qualitative factors are equally important to consider in a decision situation, this chapter is confined to quantitative decisions made based on data stated in purely monetary terms and relating to costs and benefits as measured and reported by the managerial accountant.

Quick Check exercise
Distinguish between quantitative and qualitative factors in decision making.

The most important decision-making factors in this duty are relevant costs and relevant revenues. What costs are relevant in decision-making? The answer is easy. Any cost that is avoidable is relevant for decision purposes, that is, relevant costs are those expected future costs that differ among alternative courses of action. An *avoidable cost* can be defined as a cost that can be eliminated (in whole or in part) as a result of choosing one alternative over another in a decision-making situation. The key aspects to these definitions are that the *costs must occur in the future* and that *they must differ among alternative course of action*. We focus on the future because *every decision deals with the future*-whether it be 20 seconds ahead (the decision to adjust a dial) or 20 years ahead (the decision to plant and harvest pine trees). The function of decision-making is to select courses of action for the future. *Nothing can be done to alter the past*. In addition, the future costs must differ among alternatives because if they do not, there will be no difference in costs no matter what the decision is made. Likewise, relevant revenues are those expected future revenues that differ among alternative courses of action.

The term avoidable is synonymous (identical) with the term *differential cost* that we introduced above, and these terms are frequently used interchangeably. To identify costs those are avoidable

(differential) in a particular decision situation, the manager's approach to cost analysis
should include the following steps:

(1) Assemble all of the costs associated with each alternative being considered. This means, gather more information about manufacturing costs.
(2) Eliminate those costs that are sunk.

(3) Eliminate those costs that do not differ between alternatives.
(4) Make a decision based on the remaining costs. These costs will be the differential or avoidable costs, and hence the costs relevant to the decision to be made.

We need to recognize from the outset (the beginning) of our discussion that costs that are relevant in one decision situation are not necessarily relevant in another. Simply put, this means (as we have stated before) that the manager needs *differential costs for different purposes.* For one purpose, a particular group of costs may be relevant; for another purpose, an entirely different group of costs may be relevant. Thus, in each decision situation the manager must examine the data at hand and then take the steps necessary to isolate the relevant costs. Otherwise, she/he runs the risk of being misled by irrelevant data. The concept of "*differential costs for different purposes"* is basic to managerial accounting; we shall see its application in the parts that follow.

Accountants play a significant role in the decision-making process not as decision makers but as collectors and providers of relevant information. It has earlier been stated that decisions should be based on relevant information. You may wonder what makes information relevant to a decision problem. Generally speaking, costs and benefits are relevant if they satisfy the following two conditions:

1. Bearing on the future

To be relevant, costs and benefits must relate to or affect the future event. Decision-making affects the future, not the past. Nothing can alter what has already happened in the past irrespective of management's decision, and it is irrelevant to the decision at hand. In brief, relevant information is future oriented. "There is no use in crying over spilt milk. It is water over the dam." These aphorisms help people avoid the common mistake of trying to change the past. Applying the concept to business decisions, bear in mind that *you cannot avoid a cost that has already been incurred.*

2. Differ under competing alternatives

To be relevant, costs and benefits must differ between the alternatives under consideration. That is, relevant costs and benefits make a difference between alternatives. Conversely, costs and

benefits that are the same across all the available alternatives are irrelevant and have no bearing on a decision.

To sum up, it can be said, "Only those predicated future costs and benefits that differ in total among the alternatives under evaluation are relevant in a decision situation." If costs or benefits

will be the same regardless of the alternative selected, then the decision has no effect on such costs or benefits and, therefore, they can be safely ignored or eliminated from the analysis, as they are irrelevant.

To illustrate, assume that ABC Company is considering two methods of production and is confronted with the problem of selecting one of these competing methods. The products produced are identical and are sold at the same price no matter which method is opted or decided for. You are given the complete predicted information as follows:

	Alternatives	
	Method 1	Method 2
Units produced and sold	15,000	15,000
Selling price per unit	Birr 30	Birr 30
Direct material cost per unit	18	18
Direct labor cost per unit	14	10
Variable overhead cost per unit	7	7
Fixed costs, total	70,000	76,000

From the data given, which information is relevant and which is not? Well, only the total direct labor cost and total fixed costs are relevant as they differ between the two alternative methods. Total revenue, total direct material cost, and total variable overhead cost are irrelevant, as they will not differ between the two alternative methods. Notice that, though information is future oriented, it is irrelevant if it doesn't' satisfy the second criteria (i.e., a difference between

alternatives) as well. Notice further that fixed costs that differ between alternatives are relevant while variable costs that are the same for all alternatives are irrelevant. This disproves the misconception by some that variable costs are relevant and fixed costs are irrelevant.

Should we completely ignore the past? Not really. Since relevant information involves future events, the managerial accountant must predict the amount of relevant costs and benefits based on historical data so as to pave (cover) the way for decisions. Thus, a study of the past may be of paramount importance to a firm. There is an important and subtle issue to underline here. Relevant information must involve costs and benefits that are anticipated to take place in the future. The accountant's predictions of those costs and benefits often are based on data from the past, yet. Past may be a good predictor of what the future will hold in store, indeed. The bottom line is that historical data aids in the prediction of the possible state of business affairs in the future, though it is not relevant to a decision situation by itself. Historical data have no direct bearing on a decision, but such data can have an indirect bearing on a decision because they may

help in predicting the future. Bear in mind, therefore, those past figures are irrelevant to the decision itself because the decision cannot affect past data. Decisions affect the future and nothing can alter what has already happened.

1. Sunk Costs

A sunk cost is a cost that has already been incurred in the past and that cannot be avoided irrespective of what course of action a manager decides to take. Sunk costs are always the same no matter what alternatives are being considered and are, therefore, always irrelevant or indifferent and should be ignored from the analysis in making decisions. As has been stated above, sunk costs do not affect any future cost and cannot be changed by any current or future action. An example of a sunk cost is the book value of a plant asset or inventory, among others. Sunk costs are often used synonyms to historical costs or past costs. A common behavioral tendency is to give undue importance to book values in decisions that involves replacing an asset or disposing of obsolete inventory. It is a serious mistake to think that a current or future action can influence the long-run impact of a past outlay. All past costs are down the drain. Nothing can change what has already happened. The irrelevance of past costs for decisions does not mean that knowledge of the past cost is useless. As stated earlier, past costs do help predict future costs and

affect future payments for income taxes. The past cost in itself is not relevant, yet. The only relevant cost is the predicted future cost. People often seek to justify their past decisions by refusing to dispose of an asset, even if a better alternative has been identified. The moral: Ignore sunk costs.

2. Future Costs and Benefits that do not differ

Future costs and benefits that are *identical* across all decision alternatives are not relevant and, therefore, they can be ignored in making decisions. Recall that future costs and benefits are irrelevant if they fail to meet the second criterion (i.e., difference among alternatives) at the same time.

Quick Check exercise
Outline the six-step sequence in a decision process.

5.1.Important Cost and Benefit Terminologies

Many terms related to costs and benefits have been introduced in the preceding parts or chapters. Some of them are repeated here in this chapter under this section to facilitate your understanding.

1. Avoidable costs

These are costs that can be eliminated in whole or in part by choosing one alternative over another. Avoidable costs are frequently called relevant costs as they represent future costs that differ among alternatives. In brief, costs that will be incurred or avoided as a result of making a decision are avoidable costs.

1. Unavoidable costs

Costs that do not differ between alternatives are not avoidable and, therefore, are not relevant in making decisions. These are costs that would continue to be incurred no matter which alternative is selected and, therefore, are irrelevant in decision-making situation. The committed fixed costs and allocated common costs, are examples of unavoidable costs. In brief, costs that would be incurred whether or not a decision is made are unavoidable costs.

2. Differential costs

These represent difference in cost between two alternatives. That is avoidable costs; differential cost, incremental cost, and relevant cost are often used interchangeably.

3. Differential Revenues

These stand for difference in revenue between any two alternatives. Relevant revenues are expected future revenues that differ between the alternatives under consideration. When deciding between two alternative business opportunities, a manager selects the alternative that produces the highest revenue relative to its associated costs. If the two alternatives are expected to produce the same revenue relative to cost, revenue is not relevant because it would not make a *difference* in the amount of net income that could be obtained in the future.

4. Opportunity Costs

These represent a potential benefit given up when the choice of one action precludes a different action. Although people tend to overlook or underestimate the importance of opportunity costs, they are just as relevant as out-of-pocket costs in evaluating decision alternatives. It is a common mistake for people to overlook or underweight opportunity costs and, therefore, such costs deserve particular attention.

People tend to overlook opportunity costs, or to treat such costs as less important than out-off-pocket costs. Yet opportunity costs are just as real and important to making a correct decision, as are out-of pocket costs. The moral: pay special attention to identifying and including opportunity costs in a decision analysis.

Suppose that you pay Birr 30 to acquire a ticket for admission to Addis Ababa stadium to watch a football match. Just before entering the stadium, someone offers to buy your ticket for Birr 60. If you refuse the offer, how much will it cost you to attend the event? From the perspective of managerial accounting, the answer is Birr 60. The Birr 30 original purchase price is a sunk cost and is not relevant to the decision at hand. The decision involves a choice between attending and not attending the football match. The Birr 60 offer differs between the alternatives and is future

oriented and, therefore, it is relevant. If you enter the stadium, you give up the opportunity to obtain Birr 60 cash. That is why the sacrifice of a potential benefit associated with a lost opportunity called an opportunities cost.

Suppose that you turn down the first offer to sell your ticket for Birr 60. A few minutes later, another person offers you Birr 100 for the ticket. If you refuse the second offer, does this mean that your opportunity cost has risen to Birr 160 (the first Birr 60 offer plus the second Birr 100 offer)? The answer is no as opportunity costs are not cumulative. If you had accepted the first offer, you could not have accepted the second one. You may have many opportunities, but the acceptance of one of the alternatives eliminates the possibility of accepting the others. Normally, the opportunity cost is considered to be the highest value of the available alternative courses of action. In this case, the opportunity cost of attending the football match is Birr 100.

Opportunity costs are not recorded in the financial accounting records, but they represent an information factor used in decision-making. The reason is that opportunity costs represent economic benefits forgone as a result of pursuing some course of action rather than actual Birr outlays. Remember that financial accounting is historically based, but opportunity costs are future oriented-they affect the decisions that managers make. The financial results of those decisions appear in the financial statements, but the information used to make the decisions does not. The fact that opportunity costs are not recorded does not negate their importance, although they are not a part of the financial accounting system, they are an integral part of management accounting. You would not report the Birr 100 opportunity cost as an expense on the income statement, but it will certainly affect your decision regarding whether you attend the football event. Opportunity costs are relevant costs, indeed.

Define opportunity cost.

To illustrate, assume that the manager of the Ethiopian Airlines is confronted with a decision as to whether to add two daily round-trip flights between Addis Ababa and Cairo. The monthly revenue from these new flights is estimated to be Birr 200,000 and costs are predicted to be Birr 125,000 per month. The hangar manager at Addis Ababa Bole Airport stated that the Ethiopian Airlines currently has excess space in its hanger for which an offer was received from a commuter airline to rent the hangar space for Birr 90,000 per month.

However, if the Addis Ababa-to-Cairo flights are added to the schedule, the additional aircraft needed in Addis Ababa will require the excess hanger space. Should the Ethiopian Airlines add the new flight to the schedule or rent the excess hanger space to the commuter airline? The analysis toward the decision is shown below:

	Add Flights	Don't Add Flights and Rent Hangar space	Differential (costs) and Benefits
Additional Monthly revenue	Birr 200,000	Birr 0	Birr 200,000
Less additional monthly costs	125,000	0	(125,000)
Rental of excess hanger space	0	90,000	(90,000)
Net Advantage	Birr 75,000	Birr 90,000	(15,000)

If Ethiopia Airlines adds the new Addis Ababa-to –Cairo flights, it will forgo the opportunity to rent the excess hanger space for Birr 90,000 per month. Thus, the Birr 90,000 in rent forgone is the opportunity cost of the alternative to add the new flights. In the Ethiopian Airline case, the best action is to rent the excess warehouse space to the commuter airline rather than adding the new flights. We can as well approach the problem as follows:

Additional monthly revenue ---------- Birr 200,000

Less: Additional monthly cost ---------- Birr 125,000

Opportunity cost-hanger rental forgone -- 90,000 215,000

Net disadvantage of adding the new flights ---------- Birr (15,000)

Thus, if the new flights are added, Ethiopian airlines will be worse off by Birr 15,000. In contrast, if the excess hanger space is rented to a commuter airline and the new flights are not added, the company will be better off by Birr 15,000. To sum up, Ethiopian Airline should rent the excess hanger space to a commuter airline rather than adding the new flights to the schedule.

To sum up, all future costs and benefits that do not differ between the alternatives at hand are irrelevant in a decision situation and can be ignored form the analysis. This allows us to reduce massive amounts of data into a relatively small and manageable set of data relevant to make the appropriate decisions. Moreover, ignore sunk costs, as they will be the same for the alternatives under consideration. In brief, when making decisions, eliminate all irrelevant costs and benefits and concentrate only on those items of costs and benefits that are deemed to be relevant. Thus, in a decision-making situation:

Eliminate costs and benefits that do not differ between alternatives. These are irrelevant costs and benefits and consist of:

1. Sunk costs, and
2. Future costs and benefits that do not differ between alternatives.

Use the remaining costs and benefits that are future oriented and differ between alternatives in making the decision. The costs and benefits that remain are relevant to the decision at hand.

Why is it important for the managerial accountant to isolate relevant costs and benefits in a decision analysis while considering all types of costs and benefits do the job just as well? The following are the reasons behind isolating relevant costs and benefits:

I. *Generating information is a costly affair*, which requires considerable amount of time and effort. Thus, the relevant data must be sought for and, by doing so; the managerial accountant can simplify and shorten the data-gathering process.
II. *People can effectively use only a limited amount of information*. Beyond this, they experience information overload that results in the decline of the effectiveness of their decision-making ability. By routinely providing only the information about relevant costs and benefits, the managerial accountant can reduce the likelihood of information overload and erroneous decisions. Mingling irrelevant and relevant data may cause confusion and destruct attention from the matters that are really critical.
III. *As rarely enough information is available about the alternatives under consideration*, it would be virtually impossible to make a complete analysis by taking every piece of data. Thus, we would have to rely on our ability to recognize which costs and benefits are relevant and which are not in order to assemble that data necessary to make a decision.

To sum up, the best approach is to ignore irrelevant data and base the decision entirely on the relevant data.

5.3 Relevant Data for Special Decisions

The concepts of relevant costs and relevant revenues have wide application. In the following part, we will observe their use in make or buy decision, equipment replacement decision, discontinuing of product line decision, in joint product decision or sell or process further decision, and in decision relating to the effective use of scarce resources. This list does not include all of the possible application of the relevant cost concept. Indeed, any decision involving cost hinges on the proper identification and use of those costs that are relevant, if the decision is to be made properly.

It seems that at this juncture, to make it clear that costs that are relevant in one decision situation are not necessarily relevant in another. Stated differently, the manager needs different costs for different purposes. For one purpose, a particular group of costs may be relevant and, for another purpose, an entirely different group of costs may be relevant. Thus, in each decision situation, the manger must examine the data at hand and isolate the relevant costs. Otherwise, the manager runs the risk of being misled by irrelevant data. The ability to recognize relevant costs and benefits is just as important to a decision maker as using relevant costs and benefits. How do we know that past costs, although sometimes good predictors of the future are irrelevant in decision-making?

5.3.1 Pricing Special Offer

A special order is a one-time order that is not considered part of the company's normal ongoing business. Occasionally, a company receives an offer to sell its goods at a price significantly below its normal selling price. Therefore, management must assess whether the special order should be accepted or rejected and determine the price that should be charged if the order is accepted. In brief, a careful evaluation and analysis of an offer of this type is of paramount importance in making a special order decision to accept or reject it.

Accepting a special order will increase revenues and some costs, but rejecting an order will leave revenue and costs unaffected by that order. In special order decisions, quantitative analysis of relevant costs and revenues leads to accepting or rejecting decisions. We begin the analysis by

considering what happens to existing costs and revenues if a special order is accepted. Some costs will not be affected by a decision to accept the special order because they remain the same regardless of whether the special order is accepted or rejected. Such costs are, therefore, not relevant to the decision at hand. The relevant costs are the additional (incremental) costs that will be incurred as a result of accepting the special order or, stated differently, costs that could be avoided if the special order is rejected. No doubt, if a special order is accepted, the amount of revenue will increase and this change in revenue is relevant too. Thus, in a special order decision, we consider only the relevant revenue and the relevant avoidable costs.

In general, a special order is profitable if the incremental (differential) revenue from the special order exceeds the incremental (differential) costs of the order. The profit from a special order is simply the difference between incremental revenue and incremental costs. Consequently, if incremental revenue is greater than the incremental costs and present sales are unaffected, accepting a special order will be the right decision. The following two points are worth mentioning:

If the incremental (differential) revenue exceeds the incremental (differential) costs, the special order should be accepted. That is,

Incremental revenue > Incremental cost = Accept order.

If the incremental (differential) revenue falls short of the incremental (differential) costs, the special order should be rejected, That is,

Incremental revenue < Incremental cost = Reject order.

In a special order decision, consideration of plant capacity is vital for proper determination of the effects of the order on Company's profitability. A Company may have excess (idle) capacity or no excess capacity at all, each of which are briefly explained in the following decision.

Example: MS Company manufactures special steel tea sets. Its normal capacity is 100,000 tea sets per year. The Company is able to utilize only 60% of its capacity due to recession in domestic market. Current selling price of each tea set is $1,000. Annual Fixed Cost is $12,000,000. The cost schedule at capacity of 60,000 sets is

Cost item	*per set ($)*	*total (000,000)*
Materials ¾ kg @ $400 per kg)	*$300*	*18*
Labor (10hr @ $20 per hr)	*200*	*12*
Variable overhead (10hr@10 per hr)	*100*	*6*
Total Variable cost	*600*	*36*
Total Fixed cost	*200*	*12*
Total cost	*800*	*48*

Let as assume that the company receives an offer from Song Swing Company of Singapore to 20,000 tea sets at a price of 700/seats. If the order is accepted, the company will have to incur an expenditure of $500,000 on handling, transportation etc.

Required: Should the company accept the offer?

Solution

Revenue	700 X 20,000	$14,000,000
Variable Cost	6000 X 20,000	$12,000,000
Contribution Margin	$14,000,000 - $12,000,000	$2,000,000
Additional Profit	$2,000,000 - $500,000	$1,500,000

Conclusion: We accept the project because we get $1,500,000 additional profit.

5.3.2 Make or Buy Decision

Management sometimes may have to make a choice between manufacturing the component parts of a product and buying them from outside. Such a situation of *make or buy decision* may arise whenever the firm has the idle plant capacity and the technical capability of manufacturing the component parts.

In a make or buy situation, the decision will hinge upon both qualitative and quantitative factors. The key quantitative factors are the *differential costs* of the make and buy alternatives and the consequence of the alternative uses of the idle facilities. The relevant costs of the buying alternative would include the purchase price and the ordering costs. Costs relevant for the make alternative would include the variable costs, direct material, direct labor and variable overheads and those fixed costs which are escapable (avoidable). If fixed costs are expected to remain unaltered, they would be irrelevant in the make or buy decision. The firm should compare differential costs of the make and buy alternatives to make its choice. The firm should also consider the alternatives uses of the idle facilities. If a more profitable use than manufacturing the parts exists, then the firm may procure the parts from outside and use-facilities for the more profitable alternatives.

For a variety of reasons, one company may produce a product or service for total costs less than another company. Wages rates, economies of scale, specialization, level of bureaucracy, motivation, reward structure, technological competence, degree of automation, and many other cost-related factors differ among companies. As a result, a company may purchase a product or service at a price below the cost that could have been incurred if the company were to produce the product or service for itself. The practice of buying goods and services externally from other companies is commonly known as outsourcing. Determining the relevant cost of buying goods or services is usually an easy task.

First, what happens to the existing cost if the product or service, which is currently produced internally, is outsourced must be determined. Some costs will be unaffected and other costs will decrease. If the company buys the products, it will not have to pay to have them made internally. The firm then compares the potential decrease in the existing costs of making the product or services with the cost of buying (outsourcing). *Cost minimization is achieved by selecting the make-or-buy alternative with the lowest relevant costs.*

An outsourcing decision, also called a make-or-buy decision, entails a choice between producing a product or service in-house and purchasing it from an outside supplier. Such consideration arises when a company has the capacity to produce some items it needs internally and the same items are available in the outside market. Some companies choose to *integrate*

vertically in an effort to control activities that lead to the final product and, therefore, prefer producing the parts they need internally instead of buying them externally. Similarly, some companies prefer to depend on outside suppliers for some inputs they need and specialize in only certain steps of the value chain so that they concentrate on their core activities, leaving other peripheral tasks in the value chain to those organizations that have expertise and special know-how in performing those tasks. Making a part or component internally has the following advantages:

Producing a part or component internally (integration) reduces dependence on external suppliers and may ensure a smoother flow of parts and materials for production. However, if a company purchases a part from an outside supplier, a strike in the supplier's company can interrupt the buying company's operations for many months, as it is nonintegrated.

Continue to make an item internally and reject an outside supplier's offer if the avoidable costs (costs associated with the production of an item internally) are less than the outside purchase price. That is, Avoidable costs < outside purchase price = Make internally.

Purchase an item from an outside supplier only if the outside purchase price is less than the costs that can be avoided internally as a result of stopping the production of the item. That is,

Avoidable costs > outside purchase price = Purchase from outside.

What are the most important factors in the make-or-buy decision? Surveys of company practice indicate they are quality, dependability of suppliers, and cost.

Materials-handling and setup activities occur each time a batch of HDS is made. ELC produces the 10,000 units of HDS in 25 batches of 400 units each. The number of batches is the cost driver for these costs. Total materials handling and set up costs equal fixed costs of $5,000 plus variable costs of $500 per batch [$5,000 +(25 x$500) = $17,500]. ELC commences production only after it receives a customer order. Because they are trying to lower their inventory levels, ELC‘s customers are pressuring the company to supply thermostats in smaller batch sizes. ELC anticipates that next year the 10,000 units of HDS expected to be sold will be manufactured in 50 batches of 200 units each. Through continuous improvement, ELC expects to reduce variable costs per batch for materials handling and setup to $300. No other changes in fixed costs or

variable costs per unit are anticipated. Another manufacturer offers to sell ELC 10,000 units of HDS next year for $16 per unit on whatever delivery schedule ELC wants. Assume that financial factors predominate in this make-or-buy decision. Should ELC make or buy HDS?

Columns 3 and 4 of the preceding table indicate the expected total costs and expected cost per unit of producing 10,000 units of HDS next year. Direct materials, direct manufacturing labor and variable manufacturing overhead costs that vary with units produced are not expected to change because ELC plans to continue to produce 10,000 units next year at the same variable costs per unit as this year. The costs of purchasing, receiving, and setups are expected to increase even though there is no expected change in the total production quantity. Why? Because these costs will vary with the number of batches not the quantity of production. Expected total materials handling and setup costs = $5,000 + (50batches x the cost per batch of $300) = $5,000 + $15,000 = $20,000. ELC expects fixed manufacturing over head costs to remain the same as this year. The expected manufacturing cost per unit for next year equals $18. At this cost, it seems that the company should buy HDS from the outside supplier because the expected cost per unit of making the part appears to be more costly than the $16 per unit it would cost to buy it. A make-or-buy decision, however, is rarely obvious. A key question for management is what is the difference in relevant costs between the alternatives?

For the moment, suppose the capacity now used to make HDS will become idle next year if HDS is purchased and that the $30,000 of fixed manufacturing overhead will continue to be incurred next year regardless of the decision made. Assume that the $5,000 in fixed clerical salaries to support to support setup, receiving and purchasing will not be incurred if the manufacture of HDS is completely shut down next year.

The following table presents the relevant cost computations. ELC will save $10,000 by making HDS rather than buying it from the outside supplier. Alternatively stated, purchasing HDS will cost $160,000 but will save only $150,000 in manufacturing costs. Making HDS is thus the preferred alternative.

Relevant (incremental) items for make-or Buy Decision for HDS at the Cerrito Company

	Total	per Unit

	Relevant Costs		Relevant Costs	
Relevant Items	Make	Buy	Make	Buy
Outside purchase of parts		$160,000		$16
Direct materials	$80,000		$8	
Direct manufacturing labor	10,000		1	
Variable manufacturing overhead	40,000		4	
Mixed (variable and fixed) materials				
Handing and setup overhead	20,000	—	2	—
Mixed (variable and fixed) materials				
Handing and setup overhead [a]	20,000	—	2	—
Total relevant costs	$150,000	$160,000	$15	$16
Difference in favor of making HDS		$10,000		$1

[a] Alternatively, the $30,000 of depreciation, pant insurance and plant administration costs cloud be included under both alternatives. These costs are irrelevant to the decision

Note; the key concepts of relevance presented here;

Current cost data from columns 1 and 2 of the table in the above example play no role in the analysis in the above example. why? Because for next years' make or buy decision, these costs are past costs and hence irrelevant. Their only role is to help predict what future costs will be.

The above example includes the $20,000 of purchasing, receiving and setup costs under the make alternative but not under the buy alternative. Why? Because buying HDS and not having to manufacture it will save both the future variable costs per batch and the avoidable fixed costs.

The $20,000 represents future costs that differ between the alternatives and hence is relevant to the make-or buy decision.

The above example excludes the $30,000 of plant lease, insurance, and administration costs under both the make and the buy alternatives. Why? Because although these are future costs, they will not differ between the two alternatives and are hence irrelevant.

A commonly used term decision making is incremental costs. An incremental cost is the additional cost incurred for an activity. In the above example the incremental cost of making HDS is the additional cost of $150,000. Note that the $30,000 of fixed manufacturing overhead is not an incremental cost of making HDS because ELC will incur these costs whether or not it makes HDS. Similarly, the incremental cost of buying HDS from an outside supplier is the additional cost of $160,000. A differential cost is the difference in cost between two alternatives. In the above example the differential cost between the make-HDS and buy-HDS alternatives is $10,000 ($160,000-$150,000). Sometimes incremental cost and differential costs are used interchangeably. When using these terms practice always clarify their meaning. We define incremental revenue and differential revenue in analogous manner incremental revenue is the additional revenue from an activity. Differential revenue is the difference in revenue between two alternatives.

Strategic and Qualitative Factors

Several strategic and qualitative factors affect the outsourcing decision. For example, ELC may prefer to manufacture HDS in-house to retain more control over the design, quality; reliability; and delivery schedules of the switches it uses in its thermostats. Conversely, despite the cost advantages documented in the above example ELC may prefer to outsource, become a smaller and leaner organization, and focus on areas of its core competencies— the manufacture and sale of thermostats. As an example of focus, advertising companies, like J. Walter Thompson, only do the creative and planning aspects of advertising (their core competencies) outsource production activities such as film, photographs, and illustrations.

Quick Check exercise

"Managers should always buy inventory in quantities that result in the lowest purchase cost per unit." Do you agree? Why?

5.3.3 Changing Product Mix

A Multiple product firm is at times faced with the problem of changing product mix to improve profits. Different products have their own structure &selling prices. Thus they made different contribution towards the companies fixed costs. Generally, the firm would prepare a product with higher contribution.

Example: A firm can produce three different products from the same raw materials using the same production facilities. The request labor is available in plenty at $8/hours for all products.

The supply of raw materials which is imported at $8 per kg is limited to 10,400kgs, for budget period. The variable overheads are $5.60 per hour. The fixed overheads are $50,000 from the following information you are requested to suggest the most sustainable sales mix which will maximize the firm's profits.

Products	*Marked DD (unit)*	*USP ($)*	*labor hours request per unit*	*raw materials requested per units*
X	*8,000*	*30*	*1*	*0.7*
Y	*6,000*	*40*	*2*	*0.4*
Z	*5,000*	*50*	*1.5*	*1.5*

Required: Determine the profit that will be earned at that level.

Solution

	X		*Y*		*Z*	
USP		*$30*		*$40*		*$50*

VC (material)	*$5.6**		*$3.2***		*$12****	
VC (Labor)	*8+*		*16++*		*12+++*	
VC(Overhead)	*5.6[a]*		*11.2 [aa]*		*8.4 [aaa]*	
TVC		*$19.2*		*$30.4*		*$32.4*
CM		*10.8*		*9.6*		*17.6*
Contribution per Kg/unit of mtrl/	*10.8/0.7*	*$15.43*	*9.6/0.4*	*$24*	*17.6/1.5*	*$11.73*

Thus, the sales mix with limited raw material of 10,400 kg and profit at that level of production

1st product	*0.4 X 6,000*	*2,400 kg*
Contribution of Y	*2,400 X $24*	*$57,600*
2nd product	*0.7 X 8,000*	*5,600 kg*
Contribution of X	*5,600 X $15.43*	*$86,400*
3rd product		
Contribution of Z	*2,400 X $11.73*	*$28,160*
Total Contribution Margin		*$172,160*
Less: Fixed OH cost		*50,000*
Profit		*$122,160*

Where	*8X 0.7	+8X1	[a]5.6 X 1
	**8X0.4	++8X2	[aa]5.6 X 2
	*** 8 X 1.5	+++ 8 X 1.5	[aaa]5.6 X 1.5

Quick Check exercise

"Management should always maximize sales of the product with the highest contribution margin per unit." Do you agree? Why?

5.3.4 Adding or Dropping a Product Line

In a multi-product company, the management may have to decide on adding or dropping a product line. When a new product line is added its sales & certain costs will also be increased &reverse will happen when a product line is dropped. In order to arrive at such a decision, the management should compare the differential cost &incremental revenues & study its effect on the overall profit position of the company.

In dropping product lines and other segments of a company, carefully bear in mind the following two key points:

Drop (eliminate or discontinue) a product line or other segment if you can avoid more in fixed costs than you lose in contribution margin. That is,

Fixed costs Avoided > contribution margin lost = Drop.

Retain (keep or continue) a product line or other segment if you are not able to avoid as much in fixed costs as you lose in contribution margin. That is,

Fixed costs Avoided < contribution margin lost = Retain.

You can as well compare the amount of unavoidable fixed costs with the amount of the loss to decide as to whether to drop a segment or not. Thus,

If unavoidable fixed costs > the loss = don't Drop a segment.

If unavoidable Fixed costs < the loss = Drop a segment.

Example: the management of a company is thinking whether it should drop one product item from the product line &replace it with another. Given below represents cost &output data:

Product	*USP ($)*	*UVC ($)*	*%age of sales*

Book shell *60* *40* *30%*

Table *100* *60* *20%*

Bed *200* *120* *50%*

Total FC *$750,000*

Per year sales *$2,500,000*

The change under consideration consists in dropping the line of tables &adding the line of cabinets. If this change is made the manufacture forecasts the following cost output data.

Product *USP ($)* *UVC($)* *%age of sales*

Book shelf *60* *40* *50%*

Cabinet *160* *60* *10%*

Bed *200* *120* *40%*

Total FC per year *$750,000*

Sales *$2,600,000*

Required: Should this proposal to be accepted?

Existing Situation				
	Bookshelf	Table	Bed	Total
Sales	$750,000	$500,000	$1,250,000	$2,500,000
Less: VC	500,000	$300,000	750,000	$1,550,000
CM	$250,000	$200,000	$500,000	$950,000
Less: FC				$750,000
Profit				$200,000

Proposed Situation				
	Bookshelf	Cabinet	Bed	Total
Sales	$1,300,000	$260,000	$1,040,000	$2,600,000
Less: VC	866,667	$97,500	624,000	$1,588,167
CM	$433,333	$162,500	$416,000	$1,011,833
Less: FC				$750,000
Profit				$261,833
Incremental Revenue		$2,600,000 - $2,500,000		$100,000
Less: Differential Cost		$1,588,167 - $1,550,000		38,167
Additional Profit				$61,833
Comment: The proposal to drop the line of table and add the cabinet should be accepted.				

5.3.5 Dropping a Divisions

Management of a company is sometimes required to decide whether a seemingly unprofitable division or department or product should be dropped one again, the relevant costs & impact on contributions should be examined to made the decision

Example: Diversity Company limited a diversified company, has three divisions; cement, fertilizers & textiles. The company summary of the company is profit is given below.

Cement *Fertilizer* *Textiles* *Totals (000,000)*

Sales	*$20m*	*$12m*	*$18m*	*$50m*
Less: VC	*$8m*	*$9.6m*	*$5.4m*	*$23m*
CM	*$12m*	*$2.4m*	*$12.6m*	*$27m*
Less: FC (allocated to divisions in proportion				
of sales)	*$8m*	*$4.8m*	*$7.2m*	*$20m*
Profit (loss)	*$4m*	*($2.4m)*	*45.4m*	*$27m*

After allocating the company's fixed overhead to products the fertilizer divisions increase a less of $2.4m.

Required: should the company drop this division?

By closing the fertilizers division the company save $9.6 million and lost $12 million. the relevant question is (all FCs be avoided) if not, then dropping the fertilizers division will reduce the company's profit as shown below:

FC	(20/38) X 20	10.5 million	
FC	(20/38) X 18	9.5 million	
	Cement (000,000)	Textile (000,000)	Total (000,000)
Sales	$20	$18	$38
Less: VC	$8	$5.4	$13.4
CM	$12	$12.6	$24.6
Less: FC	$10.5	$9.5	$20
Profit	$1.5	$3.1	$4.6

It does not require much thought to release that dropping the fertilizers division will not be profitable unless more than $2.4 million (that is the contribution of the fertilizers division) is

avoided in the FCs.

5.3.6 Determination of the Optimum Level of Production

The optimum level, in the level of production where profit is the maximum in order to arrive at a decision of this type a differential costs are compared with the incremental revenues at various levels of output so long as the incremental revenue exceeds differential costs it is profitable to increase the output . But as seen as the differential costs equal or exceed incremental revenue it is not more profitable to increase the volume of output.

Differential cost (Revenue) is the difference in total cost (revenue) between two alternatives For instance decision to purchase a machine, both machine perform the same function.

Incremental Cost: Another term for deferential cost when one alternative includes all the costs of the other plus some additional cost.

Incremental Cost of increasing production from 1000 automobiles to 1200 automobiles per week would be the cost of producing the additional 200 automobiles each week.

Example: accompany has a capacity of producing 100,000 units of a certain product in a month. The sales department reports that the following schedule of sales price is possible.

	Volume of production	*USP ($)*
At 60%	*60,000 units*	*$0.90*
At 70%	*70,000 units*	*$0.80*
At 80%	*80,000 units*	*$0.75*
At 90%	*90,000 units*	*$0.67*
At 100%	*100,000 units*	*$0.61*

The VC of manufacture b/n these levels is $0.15 & FC is $40,000

Required: Prepare the statement showing incremental revenues & differential cost of earn stage. At which volume of production will the profit be maximum?

Solution

Units of output	TC	DC	Sales	IR
60,000	49,000	-	54,000	-
70,000	50,500	1,500	56,000	2,000
80,000	52,000	1,500	60,000	4,000
90,000	53,500	1,500	60,300	300
100,000	55,000	1,500	61,000	700

At 80% volume of production profit is maximum. This is because at this level IR is $4,000 whereas DC is $1,500 resulting in additional profit of $2,500 (i.e $4,000 - $1,500). After 80% level DC exceeds IR there by resulting in a loss.

5.3.7 Irrelevance of Past Costs and Equipment Replacement Decisions

Dear learners! In this section, we apply the concept of relevance to decisions about replacing equipment. We especially emphasize the idea that all past costs and in, particular, book value (original cost minus depreciation) of the existing equipment are irrelevant.

Example

Tommy is manger of the engineering development division of Gold coast products, Inc. Tommy has just received a proposal signed by all ten of his engineers to replace the workstations with networked personal computers (networked PCs). Tommy is not enthusiastic about the proposal. Summary data on the workstation and networked PC machines are as follows:

Workstations Networked PCs

Original cost	$300,000	$135,000
Useful life	5 years	3 years
Current age	2 years	0 years
Remaining useful life	3 years	3 years
Accumulated depreciation	$120,000	Note acquired yet Current
book value	$180,000	Note acquired yet
Current disposal price (in cash)	$95,000	Note acquired yet
Terminal disposal price (in cash 3 years from now)	$0	$0
Annual computer-related cash-operating costs	$40,000	$1,000,000
Annual revenues	$1,000,000	$1,000,000
Annual non computer-related operating costs	$880,000	$880,000

Tommy‘s annual bonus includes a component based on division operating income. He has a promotion possibility next year that would make him a group vice president of Gold coast products.

Required

Compare the costs of the workstation and networked PC options. Consider the cumulative results for the 3 years together ignoring income taxes and time value of money.

Why might Tommy be reluctant to purchase the networked PCs?

SOLUTION

1. The following table considers all cost items when comparing future costs of the workstation and networked PC options:

	Three Years Together	
Workstations	Networked PCs	Difference

All Items	(1)	(2)	(3)=(1)-(2)
Revenues	$3,000,000	$3,000,000	$ __
Operating Costs			
No computer-related operating costs	2,640,000	2,640,000	__
Computer-related cash-operating costs	120,000	30,000	90,000
Workstations' book value			
Periodic write-off as depreciation or	180,000	__	__
Lump-sum write-off	__	180,000	__
Current disposal price of workstations	__	(95,000)	95,000
Networked PCs, written off periodically as depreciation	-__	135,000	(135,000)
Total operating costs	2,940,000	2,890,000	50,00
Operating income	$60,000	$110,000	$(50,000)

Alternatively, the analysis could focus on only those items in the preceding table that differ between the alternatives.

	Three Years Together		
Relevant Items	Workstation	Networked PCs	Difference
Computer elated cash operating costs	$120,000	$30,000	$90,000
Current disposal price of workstations	—	(95,000)	95,000

Networked PCs, written off periodically			
as depreciation.	—	135,000	(135,000)
Total relevant costs	$120,000	$70,000	$50,000

The analysis suggests that it is cost effective to replace the workstations with the networked PCs.

2 The accrual accounting operating incomes for the first year under the "keep work Stations" versus the buy networked PCs alternatives are as follows:

	Keep Workstations	Buy Networked PCs
Revenues	$1,000,000	$1,000,000
Operating costs		
No computer-related operating costs	$880,000	$880,000
Computer-related cash-operating costs	40,000	10,000
Depreciation	60,000	45,000
Loss on disposal of workstations	-	85,000[a]
Total operating costs	980,000	1, 020,000
Operating income	$20,000	$(20,000)

a $85,000 = Book value of workstations, $180,000 – current disposal price, $95,000.

Tommy would probably be far less happy with the expected operating loss of $20,000 if the networked PCs are purchased than he would be with the expected operating income of $20,000 if the workstations are kept. The decision would eliminate the component of his bonus based on operating income. He might also perceive the $20,000 operating loss as reducing his chances of being promoted to a group vice president.

5.4 CHAPTER SUMMARY

The following points are linked to the chapter's learning objectives

The six-step decision process is *Identify, define, and clarify the decision problem, Specify the criterion, Identify the possible alternatives, Develop a decision model, Collect the data* and *Make a Decision.*

To be relevant to a particular decision, a revenue or cost must meet two criteria:

(1) It must be an expected future revenue or cost, and

(2) It must differ among alternative courses of action.

The consequences of alternative actions can be quantitative and qualitative. Quantitative factors are outcomes that are measured in numerical terms. Some quantitative factors can be easily expressed in financial terms, others cannot. Qualitative factors, such as employee morale, cannot be measured in numerical terms. Due consideration must be given to both quantitative and qualitative factors in making decisions.

Two potential problems that should be avoided in relevant-cost analysis are (a) making incorrect general assumptions such as all variable costs are relevant and all fixed costs are irrelevant, and (b) losing sight of grand totals and focusing instead on unit costs.

Opportunity cost is the contribution to income that is forgone (rejected) by not using a limited resource in its next-best alternative use. The idea of an opportunity cost arises when there are multiple uses for resources and some alternatives are not selected. Opportunity cost is included in decision making because it represents the best alternative way in which an organization may have used its resources if it had not made the decision it did.

In choosing among multiple products when resource capacity is constrained, managers should emphasize the product that yields the highest contribution margin per unit of the constraining or limiting resource (factor).

Managers should ignore allocated overhead costs when making decisions about dropping and adding customers and segments. They adding focus instead on how total costs differ across alternatives.

The book value of existing equipment in equipment-replacement decisions represents past (historical) cost and therefore is irrelevant.

Top management faces a persistent challenge—that is, making sure that the performance-evaluation model of subordinate managers is consistent with the decision model. A common inconsistency is to tell subordinate managers to take a multiple- year view in their decision making but then judge their performance only on the basis of the current year's operating income.

5.5 SELF TEST EXERCISE

PART I: TRUE /FALSE/

Instruction: dear learners, please Write "True" if the statement is correct and "False" if the statement is incorrect.

1. An accountant has an important role in decision making process not as a decision maker but as collector and reporter of relevant cost data.
2. A good decision is a decision which is consistent with the objectives of the decision maker and the information available.
3. Making a good decision necessarily lead to a good result; future may bring events, both favorable and unfavorable, that could have been predicted by decision maker.
4. Information is irrelevant if it relates to revenues and costs that will differ among the alternative courses of action being considered
5. Not all expected future revenues and costs are relevant.
6. The selection of relevant data (revenues and costs) will depend on the kind of decision to be made.
7. Always, qualitative factors dictate management's make-or buy decision.
8. The book value of existing equipment in equipment-replacement decisions represents past (historical) cost and therefore is relevant.
9. Decisions about whether a producer of goods or services will in source or outsource are also called make-or-buy decisions
10. The accounting data given for an accounting period just completed are historical.

PART II: Multiple Choices

Select the best answer for each of the following multiple – choice questions:

1. Costs forgone when an individual or organization chooses one option over another are

    A. Budgeted costs.

    B. Sunk costs.

    C. Historical costs.

    D. Opportunity costs.

2. Which of the following is not a characteristic of relevant costing information? It is

    A. Associated with the decision under consideration.

    B. Significant to the decision maker.

    C. Readily quantifiable.

    . D. Related to a future endeavor.

3. A fixed cost is relevant if it is

    A. Uncontrollable.

    B. Avoidable.

    C. Sunk.

    . D. A product cost.

4. Which of the following is the least likely to be a relevant item in deciding whether to replace an old machine?

    A. Acquisition cost of the old machine

    B. Outlay to be made for the new machine

    C. Annual savings to be enjoyed on the new machine

    . D. Life of the new machine

5. Which of the following costs would be relevant in short-term decision making?

A. Incremental fixed costs

B. All costs of inventory

C. Total variable costs that are the same in the considered alternatives

D. . The cost of a fixed asset that could be used in all the considered alternatives

6. A cost is sunk if it

A. Is not an incremental

B. Is unavoidable.

C. Has already been incurred.

. D. Is irrelevant to the decision at hand.

7. In a make or buy decision, the opportunity cost of capacity could

A. Be considered to decrease the price of units purchased from suppliers.

B. Be considered to decrease the cost of units manufactured by the company.

C. Be considered to increase the price of units purchased from suppliers.

. D. Not be considered since opportunity costs are not part of the accounting records.

8. Which of the following activities within an organization would be least likely to be outsourced?

A. Accounting

B. Data processing

C. Transportation

D. . Product design

9. Which of the following costs is irrelevant in making a decision about a special order price if some of the company facilities are currently idle?

   A. Direct labor

   B. Equipment depreciation

   C. Variable cost of utilities

   . D. Opportunity cost of production

10. A manager is attempting to determine whether a segment of the business should be eliminated. The focus of attention for this decision should be on

    A. The net income shown on the segment's income statement.

    B. Sales minus total expenses of the segment.

    C. Sales minus total direct expenses of the segment.

    . D. Sales minus total variable expenses and avoidable fixed expenses of the segment.

PART III: WORK OUT

Work-out the following questions according to the directions beside each question.

1. The Award Plus Company manufactures medals for winners of athletic events and other contests. Its manufacturing plant has the capacity to produce 10,000 medals each month. Current production and sales are 7,500 medals per month. The company normally charges $150 per medal. Cost information for the current activity level is as follows:

Variable costs that vary with number of units produced	
Direct materials	$ 262,500

Direct manufacturing labor	300,000
Variable costs (for setups, materials handling, quality control, and so on) that vary with number of batches, 150 batches * $500 per batch	75,000
Fixed manufacturing costs	275,000
Fixed marketing costs	175,000
Total costs	$1,087,500

Award Plus has just received a special one-time-only order for 2,500 medals at $100 per medal. Accepting the special order would not affect the company's regular business. Award Plus makes medals for its existing customers in batch sizes of 50 medals (150 batches 50 medals per batch = 7,500 medals). The special order requires Award Plus to make the medals in 25 batches of 100 each.

Required:

1. Should Award Plus accept this special order? Show your calculations.
2. Suppose plant capacity were only 9,000 medals instead of 10,000 medals each month. The special order must either be taken in full or be rejected completely. Should Award Plus accept the special order? Show your calculations.
3. As in requirement 1, assume that monthly capacity is 10,000 medals. Award Plus is concerned that if it accepts the special order, its existing customers will immediately demand a price discount of $10 in the month in which the special order is being filled. They would argue that Award Plus's capacity costs are now being spread over more units and that existing customers should get the benefit of these lower costs. Should Award Plus accept the special order under these conditions? Show your calculations.

2. Oxford Engineering manufactures small engines. The engines are sold to manufacturers who install them in such products as lawn mowers. The company currently manufactures all the parts used in these engines but is considering a proposal from an external supplier who

wishes to supply the starter assemblies used in these engines. The starter assemblies are currently manufactured in Division 3 of Oxford Engineering. The costs relating to the starter assemblies for the past 12 months were as follows:

Direct materials	$200,000
Direct manufacturing labor	150,000
Manufacturing overhead	$400,000
Total	$750,000

Over the past year, Division 3 manufactured 150,000 starter assemblies. The average cost for each starter assembly is $5 ($750,000 ÷ 150,000).

Further analysis of manufacturing overhead revealed the following information. Of the total manufacturing overhead, only 25% is considered variable. Of the fixed portion, $150,000 is an allocation of general overhead that will remain unchanged for the company as a whole if production of the starter assemblies is discontinued. A further $100,000 of the fixed overhead is avoidable if production of the starter assemblies is discontinued. The balance of the current fixed overhead, $50,000 is the division manager's salary. If production of the starter assemblies is discontinued, the manager of Division 3 will be transferred to Division 2 at the same salary. This move will allow the company to save the $40,000 salary that would otherwise be paid to attract an outsider to this position.

Required:

2. Tidnish Electronics, a reliable supplier, has offered to supply starter-assembly units at $4 per unit. Because this price is less than the current average cost of $5 per unit, the vice president of manufacturing is eager to accept this offer. On the basis of financial considerations alone, should the outside offer be accepted? Show your calculations. (Hint: Production output in the coming year may be different from production output in the past year.)

3. How, if at all, would your response to requirement 1 change if the company could use the vacated plant space for storage and, in so doing, avoid $50,000 of outside storage charges currently incurred? Why is this information relevant or irrelevant?
4. The Northern Division of Grossman Corporation makes and sells tables and beds. The following estimated revenue and cost information from the division's activity-based costing system is available for 2011.

	4,000 Tables	5,000 Beds	Total
Revenues ($125 * 4,000; $200 * 5,000)	$500,000	$1,000,000	$1,500,000
Variable direct materials and direct manufacturing labor costs ($75 * 4,000; $105 * 5,000)	300,000	525,000	825,000
Depreciation on equipment used exclusively by each product line Marketing and distribution costs	42,000	58,000	100,000
$40,000 (fixed) + ($750 per shipment 40 shipments)	70,000		205,000
$60,000 (fixed) + ($750 per shipment * 100 shipments)		135,000	
Fixed general-administration costs of the division allocated to product lines on the basis of revenue	110,000	220,000	330,000
Corporate-office costs allocated to product lines on the basis of revenues	50,000	100,000	150,000
Total costs	572,000	1,038,000	1,610,000
Operating income (loss)	$(72,000)	$(38,000)	$(110,000)

Additional information includes the following:

a) On January 1, 2011, the equipment has a book value of $100,000, a one-year useful life, and zero disposal value. Any equipment not used will remain idle.

b) Fixed marketing and distribution costs of a product line can be avoided if the line is discontinued.
c) Fixed general-administration costs of the division and corporate-office costs will not change if sales of individual product lines are increased or decreased or if product lines are added or dropped.

Required:

1. On the basis of financial considerations alone, should the Northern Division discontinue the tables' product line for the year, assuming the released facilities remain idle? Show your calculations.
2. What would be the effect on the Northern Division's operating income if it were to sell 4,000 more tables? Assume that to do so the division would have to acquire additional equipment costing $42,000 with a one-year useful life and zero terminal disposal value. Assume further that the fixed marketing and distribution costs would not change but that the number of shipments would double. Show your calculations.
3. Given the Northern Division's expected operating loss of $110,000, should Grossman Corporation shut it down for the year? Assume that shutting down the Northern Division will have no effect on corporate-office costs but will lead to savings of all general-administration costs of the division. Show your calculations.
4. Suppose Grossman Corporation has the opportunity to open another division, the Southern Division, whose revenues and costs are expected to be identical to the Northern Division's revenues and costs (including a cost of $100,000 to acquire equipment with a one-year useful life and zero terminal disposal value). Opening the new division will have no effect on corporate-office costs. Should Grossman open the Southern Division? Show your calculations.

Chapter: 6 CHAPTER PRICING DECISION AND COST MANANGEMENT

Learning Objectives

After studying this chapter the students should able to

- *Discuss the three major influences on pricing decision*
- *Understand how companies make short-run pricing decisions*
- *Understand how companies make long-run pricing decisions*
- *Price products using the cost-plus approach*
- *Describe two pricing practices in which no cost factors are important when setting prices*
- *Explain the effects of antitrust laws on pricing*

6.1 Major Influences on Pricing Decisions

Three influences on demand and supply are customers, competitors, and costs.

1. Customers: Customers influence price through their effect on the demand for a product or service, based on factors such as the features of a product and its quality. As the Tata Motors example illustrates, companies must always examine pricing decisions through the eyes of their customers and then manage costs to earn a profit.
2. Competitors: No business operates in a vacuum. Companies must always be aware of the actions of their competitors. At one extreme, alternative or substitute products of competitors hurt demand and force a company to lower prices. At the other extreme, a company without a competitor is free to set higher prices. When there are competitors, companies try to learn about competitors technologies, plant capacities, and operating strategies to estimate competitors costs valuable information when setting prices. Because competition spans international borders, fluctuations in exchange rates between different countries currencies affect costs and pricing decisions. For example, if the yen weakens against the U.S. dollar, Japanese products become cheaper for American consumers and, consequently, more competitive in U.S. markets.
3. Costs: Costs influence prices because they affect supply. The lower the cost of producing a product, the greater the quantity of product the company is willing to supply. Generally, as companies increase supply, the cost of producing an additional unit initially

declines but eventually increases. Companies supply products as long as the revenue from selling additional units exceeds the cost of producing them. Managers who understand the cost of producing products set prices that make the products attractive to customers while maximizing operating income.

Weighing Customers, Competitors, and Costs

Surveys indicate that companies weigh customers, competitors, and costs differently when making pricing decisions. At one extreme, companies operating in a perfectly competitive market sell very similar commodity-type products, such as wheat, rice, steel, and aluminum. These companies have no control over setting prices and must accept the price determined by a market consisting of many participants. Cost information is only helpful in deciding the quantity of output to produce to maximize operating income. In less-competitive markets, such as those for cameras, televisions, and cellular phones, products are differentiated, and all three factors affect prices: The value customers place on a product and the prices charged for competing products affect demand, and the costs of producing and delivering the product influence supply.

As competition lessens even more, the key factor affecting pricing decisions is the customer s willingness to pay based on the value that customers place on the product or service, not costs or competitors. In the extreme, there are monopolies. A monopolist has no competitors and has much more leeway to set high prices. Nevertheless, there are limits. The higher the price a monopolist sets, the lower the demand for the monopolist s product as customers seek substitute products.

6.2 Costing and Pricing for the Short Run and Long Run

6.2.1 Costing and Pricing for the Short Run

Short-run pricing decisions typically have a time horizon of less than a year and include decisions such as:

A. Pricing a one-time-only special order with no long-run implications and
B. Adjusting product mix and output volume in a competitive market.

Long run pricing decisions have a time horizon of a year or longer and include pricing a product in a market where there is some flexibility in setting price.

Relevant Costs for Short-Run Pricing Decisions

The relevant costs managers must focus on include all direct and indirect costs throughout the value chain that will change in total by accepting the one-time-only special order from biding company. Assume that ABC Company produces personal computers; XYZ Company wants to bid 5000 PC from ABC Company over the last three months of 2018. After this three-month period, XYZ is unlikely to place any future sales orders with ABC. XYZ will sell PC computers under its own brand name in regions and markets where ABC does not sell PCs. Before ABC can bid on XYZ offer, ABCs managers must estimate how much it will cost to supply the 5,000 computers. ABC Company's managers should consider the following relevant costs:

Direct materials ($460 per computer x 5,000 computers) ----------	$2,300,000
Direct manufacturing labor ($64 per computer x 5,000 computers) --------	320,000
Fixed costs of additional capacity to manufacture PC----------	250,000
Total costs----------	$2,870,000

The relevant cost per computer is $574 ($2,870,000 ÷ 5,000). Therefore, any selling price above $574 will improve ABC Company's profitability in the short run.

Effect of Time Horizon on Short-Run Pricing Decisions

- ✓ Two key factors affect short-run pricing.
    1. Many costs are irrelevant in short-run pricing decisions. In the ABC example, most of ABC Company's costs in R&D, design, manufacturing, marketing, distribution, and customer service are irrelevant for the short-run pricing decision, because these costs will not change whether ABC wins or does not win the XYZ business. These costs will change in the long run and therefore will be relevant.
    2. Short-run pricing is opportunistic. Prices are decreased when demand is weak and

competition is strong and increased when demand is strong and competition is weak. As we will see, long-run prices need to be set to earn a reasonable return on investment.

6.2.2 Costing and Pricing for the Long Run

Long-run pricing is a strategic decision designed to build long-run relationships with customers based on stable and predictable prices. A stable price reduces the need for continuous monitoring of prices, improves planning, and builds long-run buyer seller relationships. But to charge a stable price and earn the target long-run return, a company must, over the long run, know and manage its costs of supplying products to customers. As we will see, relevant costs for long-run pricing decisions include all future fixed and variable costs.

Calculating Product Costs for Long-Run Pricing Decisions

Let s return to the ABC example. However, this time consider the long-run pricing decision for Personal Computers.

We start by reviewing data for the year just ended, 2019. ABC has no beginning or ending inventory of PC and manufactures and sells 150,000 units during the year. ABC uses activity-based costing (ABC) to calculate the manufacturing cost of PC. ABC has three direct manufacturing costs, direct materials, direct manufacturing labor, and direct machining costs, and three manufacturing overhead cost pools, ordering and receiving components, testing and inspection of final products, and rework (correcting and fixing errors and defects), in its accounting system. ABC treats machining costs as a direct cost of Computers because Computers are manufactured on machines that only make PCs.

ABC uses a long-run time horizon to price PCs. Over this horizon, ABCs managers observe the following:

- Direct material costs vary with number of units of PCs produced.
- Direct manufacturing labor costs vary with number of direct manufacturing labor hours used.
- Direct machining costs are fixed costs of leasing 300,000 machine-hours of capacity over multiple years. These costs do not vary with the number of machine-hours used each

year. Each unit of PCs requires 2 machine-hours. In 2019, ABC uses the entire machining capacity to manufacture PCs (2 machine-hours per unit 150,000 units = 300,000 machine-hours).

- Ordering and receiving, testing and inspection, and rework costs vary with the quantity of their respective cost drivers. For example, ordering and receiving costs vary with the number of orders. In the long run, staff members responsible for placing orders can be reassigned or laid off if fewer orders need to be placed, or increased if more orders need to be processed.

The following table summarizes manufacturing cost information to produce 150,000 units of PCs in 2019.

	Total manufacturing costs for 150,000 units	Manufacturing cost per Unit
	(1)	(2)=1/150,000 Units
Direct manufacturing costs:		
Direct Material costs		
(150,000 kits x $460per kit)	$69,000,000	$460
Direct manufacturing labor costs (480,000 DML-hours × $20 per hour)	9,600,000	64
Direct machining costs		
(300,000 machine-hours × $38 per machine-hour)	11,400,000	76

Direct manufacturing costs	$90,000,000	$600
Manufacturing overhead costs		
Ordering and receiving costs		
(22,500 orders × $80 per order)	1,800,000	12
Testing and inspection costs		
(4,500,000 testing-hours × $2 per hour)	9,000,000	60
Rework costs		
(30,000 rework-hours × $40 per hour)	1.200,000	8
Manufacturing overhead cost	$12,000,000	$80
Total manufacturing costs	$102,000,000	$680

Product Profitability of PCs for 2019 Using Value-Chain Activity-Based Costing

	Total Amounts for 150,000 Units (1)	Per Unit (2= ½)
Revenue	$150,000,000	$1000
Cost of Goods Sold	102,000,000	680
Operating Costs		
R & D Costs	540,000	36
Design costs of products and services	600,000	40

Marketing costs	15,000,000	100
Distribution costs	3,600,000	24
Customer service costs	3000,000	20
Total operating costs	$33,000,000	220
Full cost of the product	135,000,000	900
Operating income	$15,000,000	$100

Alternative Long-Run Pricing Approaches

How should managers at ABC use product cost information to price PCs in 2020?

Two different approaches for pricing decisions are as follows:

1. Market-based
2. Cost-based, which is also called cost-plus

The market-based approach to pricing starts by asking, Given what our customers want and how our competitors will react to what we do, what price should we charge? Based on this price, managers control costs to earn a target return on investment. The cost-based approach to pricing starts by asking, Given what it costs us to make this product, what price should we charge that will recoup our costs and achieve a target return on investment?

Companies operating in competitive markets (for example, commodities such as steel, oil, and natural gas) use the market-based approach. The items produced or services provided by one company are very similar to items produced or services provided by others. Companies in these markets must accept the prices set by the market.

Companies operating in less competitive markets offer products or services that differ from each other (for example, automobiles, computers, management consulting, and legal services), can use either the market-based or cost-based approach as the starting point for pricing decisions. Some companies first look at costs because cost information is more easily available and then consider customers or competitors: the cost-based approach. Others start by considering customers and competitors and then look at costs: the market-based approach. Both approaches

consider customers, competitors, and costs. Only their starting points differ. Management must always keep in mind market forces, regardless of which pricing approach it uses. For example, building contractors often bid on a cost-plus basis but then reduce their prices during negotiations to respond to other lower-cost bids.

Companies operating in markets that are not competitive favor cost-based approaches. That's because these companies do not need to respond or react to competitors prices. The margin they add to costs to determine price depends on the value customers place on the product or service.

6.3 Cost-Plus Target Rate of Return on Investment

We illustrate a cost-plus pricing formula for PCs assuming ABC uses a 9.6% markup on the full unit cost of the product when computing the selling price.

Cost base (full unit cost of PCs)	$900.00
Markup component of 9.6% (0.096 X $900)	86.40
Prospective selling price	$986.40

How is the markup percentage of 9.6% determined? One way is to choose a markup to earn a target rate of return on investment. The target rate of return on investment is the target annual operating income divided by invested capital. Invested capital can be defined in many ways. In this chapter, we define it as total assets that is, long-term assets plus current assets. Suppose ABC's (pretax) target rate of return on investment is 18% and PC's capital investment is $96 million. The target annual operating income for PCs is as follows:

Invested capital……	96,000,000
Target rate of return on investment…….	18%
Target annual operating income (0.18 x $96,000,000) ……	$17,280,000
Target operating income per unit of PC ($17,280,000 ÷ 200,000 units)……..	$ 86.40

This calculation indicates that ABC needs to earn a target operating income of $86.40 on each unit of PC. The markup ($86.40) expressed as a percentage of the full unit cost of the product

($900) equals 9.6% ($86.40 ÷ $900). Do not confuse the 18% target rate of return on investment with the 9.6% markup percentage.

- ✓ The 18% target rate of return on investment expresses ABC's expected annual operating income as a percentage of investment.
- ✓ The 12% markup expresses operating income per unit as a percentage of the full product cost per unit. ABC uses the target rate of return on investment to calculate the markup percentage.

6.4 Additional Considerations for Pricing Decisions

In some cases, cost is not a major factor in setting prices. We explore some of the ways that market structures and laws and regulations influence price setting outside of cost.

A. Price Discrimination

Price discrimination is the practice of charging different customers different prices for the same product or service. How does price discrimination work in the airline example? The demand for airline tickets comes from two main sources: business travelers and pleasure travelers. Business travelers must travel to conduct business for their organizations, so their demand for air travel is relatively insensitive to price. Airlines can earn higher operating incomes by charging business travelers higher prices. Insensitivity of demand to price changes is called demand inelasticity. Also, business travelers generally go to their destinations, complete their work, and return home without staying over a Saturday night. Pleasure travelers, in contrast, usually don't need to return home during the week, and prefer to spend weekends at their destinations. Because they pay for their tickets themselves, pleasure travelers' demand is price-elastic, lowering prices stimulates demand. Airlines can earn higher operating incomes by charging pleasure travelers lower prices.

B. Peak-Load Pricing

In addition to price discrimination, other non cost factors such as capacity constraints affect pricing decisions. Peak-load pricing is the practice of charging a higher price for the same product or service when the demand for the product or service approaches the physical limit of the capacity to produce that product or service. When demand is high and production capacity is limited, customers are willing to pay more to get the product or service. In contrast, slack or excess capacity leads companies to lower prices in order to stimulate demand and utilize

capacity. Peak-load pricing occurs in the telephone, telecommunications, hotel, car rental, and electric-utility industries.

C. International Considerations

Another example of factors other than costs affecting prices occurs when the same product is sold in different countries. Consider software, books, and medicines produced in one country and sold globally. The prices charged in each country vary much more than the costs of delivering the product to each country. These price differences arise because of differences in the purchasing power of consumers in different countries (a form of price discrimination) and government restrictions that may limit the prices that can be charged.

D. Antitrust Laws

Legal considerations also affect pricing decisions. Companies are not always free to charge whatever price they like. For example, under the U.S. Robinson-Patman Act, a manufacturer cannot price-discriminate between two customers if the intent is to lessen or prevent competition for customers. Two key features of price-discrimination laws are

as follows:

1. Price discrimination is permissible if differences in prices can be justified by differences in costs.
2. Price discrimination is illegal only if the intent is to lessen or prevent competition.

Predatory Pricing: A company engages in predatory pricing when it deliberately prices below its costs in an effort to drive competitors out of the market and restrict supply, and then raises prices rather than enlarge demand.

Dumping: Closely related to predatory pricing is dumping. Under U.S. laws, dumping occurs when a non-U.S. company sells a product in the United States at a price below the market value in the country where it is produced, and this lower price materially injures or threatens to materially injure an industry in the United States. If dumping is proven, an antidumping duty can be imposed under U.S. tariff laws equal to the amount by which the foreign price exceeds the U.S. price.

Collusive Pricing: Another violation of antitrust laws is collusive pricing. Collusive pricing occurs when companies in an industry conspire in their pricing and production decisions to achieve a price above the competitive price and so restrain trade.

6.5 Chapter summery

Customers influence price through their effect on the demand for a product or service, based on factors such as the features of a product and its quality. As the Tata Motors example illustrates, companies must always examine pricing decisions through the eyes of their customers and then manage costs to earn a profit.

No business operates in a vacuum. Companies must always be aware of the actions of their competitors. At one extreme, alternative or substitute products of competitors hurt demand and force a company to lower prices. At the other extreme, a company without a competitor is free to set higher prices. When there are competitors, companies try to learn about competitors technologies, plant capacities, and operating strategies to estimate competitors costs valuable information when setting prices. Because competition spans international borders, fluctuations in exchange rates between different countries currencies affect costs and pricing decisions. For example, if the yen weakens against the U.S. dollar, Japanese products become cheaper for American consumers and, consequently, more competitive in U.S. markets.

Long-run pricing is a strategic decision designed to build long-run relationships with customers based on stable and predictable prices. A stable price reduces the need for continuous monitoring of prices, improves planning, and builds long-run buyer seller relationships. But to charge a stable price and earn the target long-run return, a company must, over the long run, know and manage its costs of supplying products to customers. As we will see, relevant costs for long-run pricing decisions include all future fixed and variable costs.

6.6 SELF TEST EXERCISE

PART I: TRUE /FALSE/

Instruction: dear learners, please Write “True” if the statement is correct and “False” if the statement is incorrect.

1. Customers influence price through their effect on the demand for a product or service, based on factors such as the features of a product and its quality.

2. Costs influence prices because they affect supply.
3. Cost information is only helpful in deciding the quantity of output to produce to maximize operating income.
4. Companies are not always free to charge whatever price they like.
5. Price discrimination is illegal only if the intent is to lessen or prevent competition.
6. Collusive pricing occurs when companies in an industry conspire in their pricing and production decisions to achieve a price below the competitive price and so restrain trade.
7. Peak-load pricing is the practice of charging a lower price for the same product or service when the demand for the product or service approaches the physical limit of the capacity to produce that product or service.
8. Price discrimination is the practice of charging different customers different prices for the same product or service.
9. Long run pricing decisions have a time horizon of a year or less and include pricing a product in a market where there is some flexibility in setting price.
10. Companies operating in markets that are competitive favor cost-based approaches.

PARTE-II: SHRTE ANSWER

Discuss the following terms in clear way

1. What are the three major influences on pricing decisions?
2. What do companies consider when making short-run pricing decisions?
3. How do companies make long-run pricing decisions?
4. How do companies determine target costs?
5. How do companies price products using the cost-plus approach?
6. Describe price discrimination and peak-load pricing.
7. How do antitrust laws affect pricing?

Chapter: 7 DECENTRALIZATION AND TRANSFER PRICING

Learning Objectives

After studying this chapter you should be able to

- *Describe the term decentralization*
- *Distinguish between the decentralization and centralization*
- *Identify the important benefits of decentralization*
- *Define what does mean transfer pricing and identify the three methods of transfer pricing methods*
- *Identify the purpose of transfer pricing*

7.1 DECENTRALIZATION

Decentralization is the freedom for managers at lower levels of the organization to make decisions. Decentralization is more popular for-profit seeking organs where output and inputs

can be measured- than at is in nonprofit organizations. Managers can be given more freedom when the results of their decisions are measurable so that they can be held accountability for them. Decentralization is most successfully when an organization segment is relatively independent of one another –that is the decisions of manager in one segment will not affect the fortunes of another segment. If the segments do not much internal buying or selling , much buying from the same outside suppliers, or much selling , to the same outside market ,they are candidates for heavier centralization. Segment autonomy is the degree of freedom to make decisions. The greater the freedom, the greater the autonomy

Decentralization vs. Centralization

- Total decentralization means minimum constraints and maximum freedom for managers at the lowest levels of an organization to make decisions
- Total centralization means maximum constraints and minimum freedom for managers at the lowest levels of an organization to make decisions
- Companies structures generally fall somewhere in between these two extremes, as each has benefits and costs. Structure chosen cost vs. benefit analysis

Important benefits of decentralization

1. Creates greater responsiveness to local needs

Good decisions cannot be made without good information. Compared with top managers, subunit managers are better informed about their customers, competitors, suppliers, and employees, as well as about local factors that affect performance, such as ways to decrease costs, improve quality, and be responsive to customers.

2. Leads to gains from faster decision making

Decentralization speeds decision making, creating a competitive advantage over centralized organizations.

3. Increases motivation of subunit managers

Subunit managers are more motivated and committed when they can exercise initiative.

4. Assists management development and learning

Giving managers more responsibility helps develop an experienced pool of management talent to fill higher-level management positions.

5. Sharpens the focus of subunit managers: In a decentralized setting, the manager of a subunit has a concentrated focus.

Important costs and risks of decentralization

- Leads to Suboptimal Decision Making: This arises when a decision's benefit to one subunit is more than offset by the costs or loss of benefits to the organization as a whole.
  - ✓ Also called Incongruent Decision Making or Dysfunctional Decision Making
- Focuses manger's attention on the subunit rather than the company as a whole:
- Increases costs of gathering information
- Results in duplication of activities

Decentralization and Multinational Firms

- Multinational firms – companies that operate in multiple countries – are often decentralized because centralized control of a company with subunits around the world is often physically and practically impossible
- Decentralization enables managers in different countries to make decisions that exploit their knowledge of local business and political conditions and to deal with uncertainties in their individual environments
- Biggest Drawback to International Decentralization: Loss or lack of control

Choices about Responsibility Centers

- Responsibility center is a set of activities assigned to a manager, a group of managers, or other employees.

  Example: A set of machines and machinating tasks, may be a responsibility center of the production supervisor, the full production department may be a responsibility center for the department head and the center organization may be a responsibility center for the president.

- An effective management control system gives each lower level manager responsibility for a group of activities and objectives.

Responsibility Accounting: identifying what parts of the organization have primary responsibility for each objective, developing measures and targets to achieve and creating reports of these measures by organization subunit or responsibility center.

Responsibility center usually are classified according to their financial responsibility as costs centers, profit centers or investment centers.

Costs center: responsibility center in which a manager is responsible (accountable) for costs only. Its financial responsibilities are to control and report only costs.

For example: an assembly department may be supervised by one manager it may contain several assembly lines and regard each assembly lines as a separated cost center.

Revenue center: the manager is accountable for revenues only.

Profit center: The responsibility center for controlling revenues as well as expenses (or costs) that is profitability.

All profit managers are responsibility for both revenues &costs, but they may be expected to maximize profits.

Investment center: responsibility center which success is measured not only by its income but also by relating that income to its invested capital, as in a ratio of income to the value of the capital employed\

7.2 TRANSFER PRICING

- Transfer price is the amount of charged by one segment or subunit (department or division) of an organization for a product or services that it supplies to another segment /subunit/ of the same organization.
- Management control systems use transfer prices to coordinate the actions of subunits and to evaluate their performance
- The transfer price creates revenues for the selling subunit and purchase costs for the buying subunit affecting each subunit's operating income
- Intermediate Product – the product or service transferred between subunits of an organization

Criteria for Evaluating Transfer Prices

As in all management control systems, transfer prices should help achieve a company's strategies and goals and fit its organization structure. We describe four criteria to evaluate transfer pricing:

(1) Transfer prices should promote goal congruence.
(2) They should induce managers to exert a high level of effort. Subunits selling a product or service should be motivated to hold down their costs; subunits buying the product or service should be motivated to acquire and use inputs efficiently.
(3) The transfer price should help top management evaluate the performance of individual subunits.
(4) If top management favors a high degree of decentralization, transfer prices should preserve a high degree of subunit autonomy in decision making.

Purpose of transfer pricing

Why does transfer pricing system exist? The principal reason is to communicate data that will lead to goal-congruent decisions. For example, transfer prices should guide managers,

1) To make the best possible decisions regarding whether to buy or to sell products and services inside or the outside the total organization.
2) To evaluate segment performance and thus motivate both the selling manager and the buying manager toward goal congruent decisions.
3) To minimize their worldwide taxes, duties & tariffs, (multinational companies.)
   - These are easy goals to describe, but they are difficult goals to achieve.
   - Organizations solve their problems by using cost based prices for same transfers market based prices for other transfer and negotiated prices for others.

Transfer pricing methods

There are three broad categories of methods for determining transfer prices. They are as follows:

1. Market-based Transfer Prices
2. Cost-based Transfer Prices
3. Negotiated Transfer Prices

Market-Based Transfer Prices

- ✓ Top management chooses to use the price of similar product or service that is publicly available. Sources of prices include trade associations, competitors, etc.
- ✓ Lead to optimal decision-making when three conditions are satisfied:
  - ꕥ The market for the intermediate product is perfectly competitive
  - ꕥ Interdependencies of subunits are minimal
  - ꕥ There are no additional costs or benefits to the company as a whole from buying or selling in the external market instead of transacting internally
- ✓ A perfectly competitive market exists when there is a homogeneous product with buying prices equal to selling prices and no individual buyer or seller can affect those prices by their own actions
- ✓ Allows a firm to achieve goal congruence, motivating management effort, subunit performance evaluations, and subunit autonomy
- ✓ Perhaps should not be used if the market is currently in a state of "distress pricing"
- ✓ Equivalent to what is being charged in the outside market for similar goals.
- ✓ If there is a comparative market for the product or services being transferred internally, using the market price as a transfer price will generally lead to the desired goal congruence & managerial effort.
- ✓ The market price may come from published price lists for similar products or services or it, may be the price charged by the products division to its external customers.
- ✓ The internal transfer price may be the external market price less the selling and delivery expenses that are not incurred on internal business.
- ✓ The major drawback to market-based prices is that market prices are not always available for items transferred internally.

Nonmarket based transfer pricing

- ❖ Market prices have innate appeal in a profit –center, center text, but they are not curing all answer to transfer pricing problems. Sometimes market prices do not exist, are in applicable, or are impossible to determine for example no intermediate markets may exist for specialized parts, or markets may be too thin or scattered to permit the determination of a credible price. when market prices cannot be used visional of "cost-plus-a-profit
- ❖ 'Are often used as a fair substitute.

Cost-Based Transfer Prices

- About half of the major companies in the world transfer items at cost. However, there are many possible definitions of cost. Some companies, use only variable cost, others, use full cost and still others use full cost-plus markup same use standards costs and same us actual costs.
- When transfer prices are same version of cost, transfer pricing is nearly identifiable to cost allocations. Costs are accumulated in one segment and then assigned to (or transferred to) another segment.
- Top management chooses a transfer price based on the costs of producing the intermediate product. Examples include:
    - Variable Production Costs
    - Variable and Fixed Production Costs
    - Full Costs (including life-cycle costs)
    - One of the above, plus some markup
- Useful when market prices are unavailable, inappropriate, or too costly to obtain
- Cost-Based Transfer Pricing Alternatives:
- ✓ Prorating the difference between the maximum and minimum cost-based transfer prices
- ✓ Dual-Pricing: using two separate transfer-pricing methods to price each transfer from one subunit to another. Example: selling division receives full cost pricing, and the buying division pays market pricing.

The drawbacks of this approach include:

1. Using full cost as a transfer price can lead to sub optimization because it does not distinguish between variable costs, which may be relevant to the transfer pricing decision, and fixed costs, which may be irrelevant.
2. If cost is used as the transfer price, the selling division will never show a profit on any internal transfer. The only division that shows a profit is the division that makes the final sale to an outside party.
3. Cost-based transfer prices do not provide incentives to control costs. If the actual costs of one division are passed on to the next, there is little incentive for anyone to work on reducing costs.

Negotiated Transfer Prices

- Companies heavily committed to segment autonomy often allow managers to negotiate transfer prices. The managers may consider both costs &market prices in their negotiations, but no policy requires them to do so.
- Supporters of negotiated transfer prices maintain that the managers involved have the best knowledge of what the company will gain or lose by producing and transferring the product or services, so open negotiation allows the managers to make optimal decisions.
- Occasionally, subunits of a firm are free to negotiate the transfer price between themselves and then to decide whether to buy and sell internally or deal with external parties
- May or may not bear any resemblance to cost or market data
- Often used when market prices are volatile
- Represent the outcome of a bargaining process between the selling and buying subunits

Negotiated transfer prices have two advantages.

1) They preserve the autonomy of the divisions, which is consistent with the spirit of decentralization. The managers negotiating the transfer price are likely to have much better information about the potential costs and benefits of the transfer than others in the company.
2) The range of acceptable transfer prices is the range of transfer prices within which the profits of both divisions participating in the transfer would increase. The lower limit is determined by the selling division. The upper limit is determined by the buying division.

Negotiated transfer prices have three disadvantages that are commonly mentioned.

1) One divisional manager, possessing private information, may take advantage of another divisional manager.
2) Performance measures may be distorted by the negotiating skills of managers.
3) Negotiation can consume considerable time and resources.

Comparison of Transfer-Pricing Methods

Criteria	Market-Based	Cost-Based	Negotiated
Achieves goal congruence	Yes, when markets are competitive	Often, but not always	Yes
Motivates management effort	Yes	Yes, when based on budgeted costs; less incentive to control costs if transfers are based on actual costs	Yes
Useful for evaluating subunit performance	Yes, when markets are competitive	Difficult unless transfer price exceeds full cost and even then is somewhat arbitrary	Yes, but transfer prices are affected by bargaining strengths of the buying and selling divisions
Preserves subunit autonomy	Yes, when markets are competitive	No, because it is rule-based	Yes, because it is based on negotiations between subunits
Other factors	Market may not exist, or markets may be imperfect or in distress	Useful for determining full cost of products and services; easy to implement	Bargaining and negotiations take time and may need to be reviewed repeatedly as conditions change

Example 1: The Safeway division of Amco Products manufactures batteries that it sells primarily to the Alpha-Beta division for inclusion with that division's main product. In 19A, half of the batteries were sold to outside companies at a price of $2 each. The remaining batteries went to the Alpha-Beta division. Cost data for 19B for the Safeway division are given below.

Production	120,000 units
Variable manufacturing costs	$120,000
Fixed overhead	$60,000
Selling expenses (all variable)	$30,000
Administrative expenses (all fixed)	$20,000

Required:

1. What should be the transfer price for the batteries if the company uses:
   (a) Market price?

(b) Variable cost?

(c) A negotiated transfer price that will yield a markup of 20 percent on its product cost (absorption cost) for Safeway?

2. Prepare a schedule of Safeway division's contribution margin for each of the transfer pricing alternatives computed in part 1.

SOLUTION

1.

(a) Market price: $2 per unit

(b) Variable cost: ($120,000 + $30,000)/120,000 units = $1.25 per unit

(c) Absorption cost: $120,000 + $60,000 = $180,000

$180,000/120,000units = $1.50 per unit

Thus, the negotiated transfer price is:

$1.50 +20% ($1.50) = $1.50 +$0.30 = $1.80 per unit

Safeway Division's Net Income

	Market Price		Variable Cost		Negotiated Transfer Price	
	Alpha-Beta	Outside Supplier	Alpha-Beta	Outside Supplier	Alpha-Beta	Outside Supplier
Sales:	(60,000 units)	(60,000 units)				
To outside supplier	—	$120,000	—	$120,000	—	$120,000
To Alpha-Beta	$120,000		$75,000		$108,000	
Variable costs:						
Manufacturing	60,000	60,000	60,000	60,000	60,000	60,000
Selling	15,000	15,000	15,000	15,000	15,000	15,000
Contribution margin	$ 45,000	$ 45,000	$ 0	$ 45,000	$ 33,000	$ 45,000
Total divisional CM	$90,000		$45,000		$78,000	

Example 2: RaceFest Inc. has two operating divisions. The Ski Division makes water and snow skis, and the Binding Division makes rubber boots for water skis. The Binding Division estimates that 800,000 pairs of boots will be produced in 2010; of those, 600,000 pairs will be sold to the Ski Division and 200,000 pairs will be sold externally. Managers of the two divisions are in the process of determining a transfer price for a pair of boots. The following information for the Binding Division is available:

Direct material	$27	
Direct labor	12	
Variable overhead	7	
Variable S&A (both for external and internal sales)	4	
Total variable cost		$50
Fixed overhead (rate based on estimated annual production)	$10	
Fixed selling and administrative (rate based on estimated annual sales)	5	
Total fixed cost		15
Total cost per pair of boots		$65
Markup on total variable cost (40%)		20
List price to external customers		$85

Required:

a) Determine a transfer price based on variable production cost.
b) Determine a transfer price based on total variable production cost plus normal markup.
c) Determine a transfer price based on full production cost.
d) Determine a transfer price based on total cost per pair of boots.
e) Prepare the journal entries for the Binding (selling) and Ski (buying) segments if the transfer is made at the external selling price for the selling division and the full production cost for the buying division.
f) Assume that the Binding Division has no alternative use for the facilities that make the rubber boots for internal transfer. Also assume that the Ski Division can buy equivalent boots externally for $80. Calculate the upper and lower limits for which the transfer price should be set.
g) Compute a transfer price that divides the "profit" between the two divisions equally.

h) In contrast to the assumption in part (f), assume that a large portion of the facilities in which boots are produced can be rented for $600,000 if the Binding Division makes boots only for external sale. Determine the lower limit of the transfer price.

Solution

A. Direct material	$27
Direct labor	12
Variable overhead	7
Transfer price	$46
B. Total variable cost	$50
Markup (40%)	20
Transfer price	$70
C. Variable production cost	$46
Fixed production cost	10
Transfer price	$56
D. Total variable cost	$50
Total fixed cost	15
Transfer price	$65

E. Binding Division:

Accounts Receivable—Ski Division (600,000 X $56)	33,600,000	
Intracompany Profits* (600,000 X $29)	17,400,000	
Intracompany Sales* (600,000 X $85)		51,000,000

Intracompany Cost of Goods Sold (CGS)* (600,000 X $56)	33,600,000	
Finished Goods (600,000 X $56)		33,600,000

*Note: When company income statements are prepared,

these amounts would be eliminated as follows:

Intracompany Sales	51,000,000	
Intracompany CGS		33,600,000
Intracompany Profits		17,400,000

In addition, any remaining amounts of intracompany Accounts Receivable and Accounts Payable shown by the two divisions would be eliminated.

Ski Division:

Inventory (600,000 X$56)	33,600,000	
Accounts Payable—Binding Division		33,600,000

F. Upper limit: Ski Division's external purchase price	$80
Lower limit: Total variable cost of Binding Division	$50
G. (Lower limit + Upper limit) / 2	($50 + $80) /2 =$130/2 = $65
H. $600,000/ 600,000 pairs of boots	$1 opportunity cost per pair
Lower limit: Incremental variable cost of Binding Division + Opportunity cost	$50 + $1 = $51

7.3 THE NEED FOR MANY TRANSFER PRICES

- The "correct" prices depend on the economic and legal circumstances &the decision at hand. The optimal prices for either may differ from that employed for tax reporting or for other external needs.
- Income taxes property taxes & tariffs often influence the setting of transfer prices so that the firm as a whole will benefit ,even though the performance of a segment may supper. For example, to maximize tax deductions for percentages depletion allowances, which are based on revenues, a petroleum company may want to transfer crude oil to other segments at as high as prices as legally possible.
- Transfer pricing is also influenced in some situations by state fair trade laws & national antitrust acts. because of the differences in national tax structures around the world, or because of the differences in the incomes of various divisions & subsidiaries, the firm may wish to shift profits & "dump" goods, if legally possible.

7.4 MULTINATIONAL TRANSFER PRICING

- Transfer pricing policies of domestic companies focus on goal congruence and motivation, multinational companies use transfer prices to minimize worldwide income taxes, import duties and tariffs.
- Suppose a division in a high-income taxes rate country produces subcomponents for another division in a low-income tax rate country. By setting a low recognized in the low –income –tax-rate country, thereby minimizing taxes.

Example 1: consider an item produced by division A in a country with a 25% income tax rate and transferred to division B in a country with 50% income tax rate. In addition to an import duty equal to 20% of the price of the item is assessed. Suppose the full unit cost of the items is $100, and the variable cost is $60. If tax authorities also variable –or full –cost transfer prices, which should be chosen? By transferring at $100 rather than $60, the company gains $2 per units.

Effect of transferring at $100 instead of at $60

Income of A is $40 higher: therefore, A pays 25%x$40 more Income taxes ($10)

Income of B is $40 lower: therefore, B pays 50% x $40 less income taxes $20)

Import duty is paid by B on an additional $100 -$60= $40,

Therefore B pays 20%x$40 more duty ($ 8)

Net savings from transferring at $100 instead of $60 $2

Example 2: Tech Friendly Computer, Inc., with headquarters in San Francisco, manufactures and sells a desktop computer. Tech Friendly has three divisions, each of which is located in a different country:

a. China division—manufactures memory devices and keyboards
b. South Korea division—assembles desktop computers using locally manufactured parts, along with memory devices and keyboards from the China division
c. U.S. division—packages and distributes desktop computers

Each division is run as a profit center. The costs for the work done in each division for a single desktop computer are as follows:

China division: Variable cost = 900 yuan

Fixed cost = 1,980 yuan

South Korea division: Variable cost = 350,000 won

Fixed cost = 470,000 won

U.S. division: Variable cost = $125

Fixed cost = $325

Chinese income tax rate on the China division's operating income: 40%

South Korean income tax rate on the South Korea division's operating income: 20%

U.S. income tax rate on the U.S. division's operating income: 30%

Each desktop computer is sold to retail outlets in the United States for $3,800. Assume that the current foreign exchange rates are as follows:

9 yuan= $1 U.S.

1,000 won = $1 U.S.

Both the China and the South Korea divisions sell part of their production under a private label. The China division sells the comparable memory/keyboard package used in each Tech Friendly desktop computer to a Chinese manufacturer for 4,500 yuan. The South Korea division sells the comparable desktop computer to a South Korean distributor for 1,340,000 won.

Required:

1) Calculate the after-tax operating income per unit earned by each division under the following transfer pricing methods: (a) market price, (b) 200% of full cost, and (c) 300% of variable cost. (Income taxes are not included in the computation of the cost-based transfer prices.)
2) Which transfer-pricing method(s) will maximize the after-tax operating income per unit of Tech Friendly Computer?

Solution

1. This is a three-country, three-division transfer-pricing problem with three alternative transfer-pricing methods. Summary data in U.S. dollars are:

China Plant

Variable costs: 900 Yuan ÷ 9 Yuan per $ = $100 per subunit

Fixed costs: 1,980 Yuan ÷ 9 Yuan per $ = $220 per subunit

South Korea Plant

Variable costs: 350,000 Won ÷ 1,000 Won per $ = $350 per unit

Fixed costs: 470,000 Won ÷ 1,000 Won per $ = $470 per unit

U.S. Plant

Variable costs: = $125 per unit

Fixed costs: = $325 per unit

Market prices for private-label sale alternatives:

China Plant: 4,500 Yuan ÷ 9 Yuan per $ = $500 per subunit

South Korea Plant: 1,340,000 Won ÷ 1,000 Won per $ = $1,340 per unit

The transfer prices under each method are:

a. Marketprice
   - China to South Korea = $500 per subunit
   - South Korea to U.S. Plant = $1,340 per unit

b. 200%offullcosts

China to South Korea: 2.0 ($100 + $220) = $640 per subunit

South Korea to U.S. Plant: 2.0 ($640 + $350 + $470) = $2,920 per unit

c. 300% of variable costs

   - China to South Korea: 3.0 $100 = $300 per subunit
   - South Korea to U.S. Plant: 3.0 ($300 + $350) = $1,950 per unit

1. Calculating after tax income for each division under three methods

China division Income statement

	Method A (Market Price)	Method B (200% of full costs)Method B	Method C(300% of variable cos)
Revenue per unit	$500	$640	$300
Variable cost per unit	100	100	100
Fixed cost per unit	220	220	220

Total cost per unit	$320	$320	$320
Operating income per unit	$180	$320	($20)
Income tax 40%	72	128	0
Net income per unit	$108	$192	($20)

South Korea Division Income Statement

	Method A (Market Price)	Method B (200% of full costs)	Method C(300% of variable cos)
Revenue per unit	$1340	$2920	$1950
Transferred in-cost per unit	500	640	300
Variable cost per unit	350	350	350
Fixed cost per unit	470	470	470
Total cost per unit	$1320	$1460	$1120
Operating income per unit	$20	$1460	$830
Income tax 20%	4	292	166
Net income per unit	$16	$1168	$664

USA Division Income Statement

	Method A (Market Price)	Method B (200% of full costs)	Method C(300% of variable costs)

Revenue per unit	$3800	$3800	$3800
Transferred in-cost per unit	1340	2920	1950
Variable cost per unit	125	125	125
Fixed cost per unit	325	325	325
Total cost per unit	$1790	$3370	$2400
Operating income per unit	$2010	$430	$1400
Income tax 20%	603	129	420
Net income per unit	$1407	$301	$980

2. Division net income

	Market price	200% of full costs	300% of variable costs
China division	$108	$192	($20)
South Korea division	16	1168	664
USA division	1407	301	980
User friendly computer Inc	$1531	$1661	$1624

User Friendly will maximize its net income by using 200% of full costs as the transfer-price. This is because Method B sources the largest proportion of income in Korea, the country with the lowest income tax rate.

7.5 CHAPTER SUMMERY

Decentralization is the freedom for managers at lower levels of the organization to make decisions. Decentralization is more popular for-profit seeking organs where output and inputs can be measured- than at is in nonprofit organizations. Managers can be given more freedom when the results of their decisions are measurable so that they can be held accountability for them. Decentralization is most successfully when an organization segment is relatively independent of one another –that is the decisions of manager in one segment will not affect the fortunes of another segment.

Responsibility center is a set of activities assigned to a manager, a group of managers, or other employees. An effective management control system gives each lower level manager responsibility for a group of activities and objectives. Responsibility Accounting: identifying what parts of the organization have primary responsibility for each objective, developing measures and targets to achieve and creating reports of these measures by organization subunit or responsibility center. Responsibility center usually are classified according to their financial responsibility as costs centers, profit centers or investment centers.

Transfer price is the amount of charged by one segment or subunit (department or division) of an organization for a product or services that it supplies to another segment /subunit/ of the same organization. Management control systems use transfer prices to coordinate the actions of subunits and to evaluate their performance. The transfer price creates revenues for the selling subunit and purchase costs for the buying subunit affecting each subunit's operating income. Intermediate Product – the product or service transferred between subunits of an organization.

7.6 SELF TEST EXERCISE

PART I: TRUE /FALSE/

Instruction: dear learners, please Write "True" if the statement is correct and "False" if the statement is incorrect.

1. Decentralization is less popular for-profit seeking organs where output and inputs can be measured- than at is in nonprofit organizations.
2. Decentralization is most successfully when an organization segment is relatively dependent on another –that is the decisions of manager in one segment will not affect the fortunes of another segment.
3. A perfectly competitive market exists when there is a heterogeneous product with buying prices equal to selling prices and no individual buyer or seller can affect those prices by their own actions
4. Market prices have foreigner appeal in a profit –center, center text, but they are not curing all answer to transfer pricing problems.
5. Total centralization means minimum constraints and maximum freedom for managers at the lowest levels of an organization to make decisions
6. The internal transfer price may be the external market price less the selling and delivery expenses that are not incurred on internal business.
7. The major drawback to market-based prices is that market prices are not always available for items transferred internally.
8. Supporters of negotiated transfer prices maintain that the managers involved have the best knowledge of what the company will gain or lose by producing and transferring the product or services, so open negotiation allows the managers to make optimal decisions.
9. The transfer price creates revenues for the selling subunit and purchase costs for the buying subunit affecting each subunit's operating income
10. Responsibility center is a set of activities assigned to a manager, a group of managers, or other employees.

PART II: Multiple Choices

Select the best answer for each of the following multiple – choice questions:

1. One of the following is not the disadvantages of negotiated transfer pricing method,
   A. One divisional manager, possessing private information, may take advantage of another divisional manager.
   B. Performance measures may be distorted by the negotiating skills of managers.
   C. Negotiation can consume considerable time and resources.

D. They preserve the autonomy of the divisions, which is consistent with the spirit of decentralization.

2. Top management chooses a transfer price based on the following costs of producing the intermediate product, except one.
   A. Variable Production Costs
   B. Variable and Fixed Production Costs
   C. Full Costs (including life-cycle costs)
   D. One of the above, plus some markup
   E. None of them
3. Which one of the following is the purpose of transfer pricing?
   A. To make the best possible decisions regarding whether to buy or to sell products and services inside or the outside the total organization.
   B. To evaluate segment performance and thus motivate both the selling manager and the buying manager toward goal congruent decisions.
   C. To minimize their worldwide taxes, duties & tariffs, (multinational companies.)
   D. All of the above
4. Products or services that are transferred between different subunits of a company are classified as
   A. mobile products
   B. dysfunctional products
   C. intermediate product
   D. territorial product
5. Method of pricing, when two separate pricing methods are used to price, transfer of products from one subunit to another, is called
   A. dual pricing
   B. functional pricing
   C. congruent pricing
   D. optimal pricing
6. Some of the methods used for determining transfer prices are
   A. market-based transfer prices
   B. cost-based transfer prices

C. negotiated transfer prices

D. all of above

7. Which of the following manager is held responsible for only the cost incurred in the unit?

A. Cost center manager

B. Revenue center manager

C. Profit center manager

D. Investment center manager

I. ANSWER KEYS FOR SELF TEST EXERCISES

CHAPTER ONE

Parte-I: True/False

1. True
2. False
3. True
4. False
5. True
6. True
7. True
8. True
9. True
10. False

Part II: Multiple Choices

1. A
2. D
3. C
4. D
5. B
6. B
7. B
8. C
9. D
10. B
11. A

Part III: Workout

Q1.

1a.	Sales ($68 per unit × 410,000 units)	$27,880,000

Variable costs ($60 per unit × 410,000 units)		24,600,000
Contribution margin		$ 3,280,000

1b.

Contribution margin (from above)	$3,280,000
Fixed costs	1,640,000
Operating income	$1,640,000

2a.

Sales (from above)		$27,880,000
Variable costs ($54 per unit × 410,000 units)		22,140,000
Contribution margin		$ 5,740,000

2b.

Contribution margin	$5,740,000
Fixed costs	5,330,000
Operating income	$ 410,000

Operating income is expected to decrease by $1,230,000 ($1,640,000 − $410,000) if Ms. Schoenen's proposal is accepted.

The management would consider other factors before making the final decision. It is likely that product quality would improve as a result of using state of the art equipment. Due to increased automation, probably many workers will have to be laid off. Garrett's management will have to consider the impact of such an action on employee morale. In addition, the proposal increases the company's fixed costs dramatically. This will increase the company's operating leverage and risk.

Q2.

1a. SP = 6% × $1,500 = $90 per ticket

VCU = $43 per ticket

CMU = $90 – $43 = $47 per ticket

FC = $23,500 a month

$$Q = \frac{FC = \$23{,}500\ CMU}{\$47 \text{ per ticket}}$$

= 500 tickets

1b. $Q = \frac{FC\ TOI}{CMU} = \frac{\$23,500\ \$17,000}{\$47 \text{ per ticket}}$

$= \frac{\$40,500}{\$47 \text{ per ticket}}$

= 862 tickets (rounded up)

2a. SP = \$90 per ticket

VCU = \$40 per ticket

CMU = \$90 – \$40 = \$50 per ticket

FC = \$23,500 a month

$Q = \frac{FC = \$23,500\ CMU}{\$50 \text{ per ticket}}$

= 470 tickets

2b. $Q = \frac{FC\ TOI}{CMU} = \frac{\$23,500\ \$17,000}{\$50 \text{ per ticket}}$

$= \frac{\$40,500}{\$50 \text{ per ticket}}$

= 810 tickets

3a. SP = \$60 per ticket

VCU = \$40 per ticket

CMU = \$60 – \$40 = \$20 per ticket

FC = \$23,500 a month

$Q = \frac{FC = \$23,500\ CMU}{\$20 \text{ per ticket}}$

= 1,175 tickets

3b. $Q = \frac{FC\ TOI}{CMU} = \frac{\$23,500\ \$17,000}{\$20 \text{ per ticket}}$

$$= \frac{\$40{,}500}{\$20 \text{ per ticket}}$$

$$= 2{,}025 \text{ tickets}$$

The reduced commission sizably increases the breakeven point and the number of tickets required to yield a target operating income of $17,000:

	6% Commission (Requirement 2)	Fixed Commission of $60
Breakeven point	470	1,175
Attain OI of $10,000	810	2,025

4a. The $5 delivery fee can be treated as either an extra source of revenue (as done below) or as a cost offset. Either approach increases CMU $5:

SP = $65 ($60 + $5) per ticket

VCU = $40 per ticket

CMU = $65 – $40 = $25 per ticket

FC = $23,500 a month

$$Q = \frac{FC}{\$25 \text{ per ticket}} = \frac{\$23{,}500 \text{ CMU}}{}$$

= 940 tickets

4b. $$Q = \frac{FC + TOI}{CMU} = \frac{\$23{,}500 + \$17{,}000}{\$25 \text{ per ticket}}$$

$$= \frac{\$40{,}500}{\$25 \text{ per ticket}}$$

= 1,620 tickets

The $5 delivery fee results in a higher contribution margin which reduces both the breakeven point and the tickets sold to attain operating income of $17,000.

CHAPTER TWO

Part I: Multiple Choices

1. A
2. D
3. B
4. C
5. E
6. D
7. B
8. C
9. B
10. D
11. A
12. D
13. D
14. C
15. D

Part II: True/false/

1. False
2. True
3. False
4. True
5. False
6. True
7. True
8. False
9. False
10. False

Part III: Workout

Q1.

Rouse & Sons	2011 Volume	At 2011 Selling Prices	Expected 2012 Change in Volume	Expected 2012 Volume
Radon Tests	12,200	$290	+6%	12,932
Lead Tests	16,400	$240	-10%	14,760

Rouse & Sons Sales Budget

For the Year Ended December 31, 2012

	Selling Price	Units Sold	Total Revenues
Radon Tests	$290	12,932	$3,750,280
Lead Tests	$240	14,760	3,542,400
			$7,292,680

2.

Rouse & Sons	2011 Volume	Planned 2012 Selling Prices	Expected 2012 Change in Volume	Expected 2012 Volume
Radon Tests	12,200	$290	+6%	12,932
Lead Tests	16,400	$230	-7%	15,252

Rouse & Sons Sales Budget

For the Year Ended December 31, 2012

	Selling Price	Units Sold	Total Revenues
Radon Tests	$290	12,932	$3,750,280
Lead Tests	$230	15,252	3,507,960
			$7,258,240

Expected revenues at the new 2012 prices are $7,258,240, which is lower than the expected 2012 revenues of $7,292,680 if the prices are unchanged. So, if the goal is to maximize sales revenue and if Jim Rouse's forecasts are reliable, the company should not lower its price for a lead test in 2012.

Q2.

Budgeted sales in units	200,000

Add target ending finished goods inventory	25,000
Total requirements	225,000
Deduct beginning finished goods inventory	15,000
Units to be produced	210,000

Q3.

Direct materials to be used in production (bottles)	2,500,000
Add target ending direct materials inventory (bottles)	80,000
Total requirements (bottles)	2,580,000
Deduct beginning direct materials inventory (bottles)	50,000
Direct materials to be purchased (bottles)	2,530,000

Q4.

Production Budget:

	Finished Goods (units)
Budgeted sales	45,000
Add target ending finished goods inventory	18,000
Total requirements	63,000
Deduct beginning finished goods inventory	16,000
Units to be produced	47,000

Direct Materials Purchases Budget:

	Direct Materials (in gallons)
Direct materials needed for production (47,000 3)	141,000
Add target ending direct materials inventory	50,000

Total requirements	191,000
Deduct beginning direct materials inventory	60,000
Direct materials to be purchased	131,000

CHAPTER THREE

Part I: True/False/

1. False
2. True
3. True
4. False
5. True
6. True
7. True
8. True

Part II: Multiple Choices

1. C
2. B
3. B
4. B
5. C
6. B
7. B
8. A
9. A
10. B
11. D

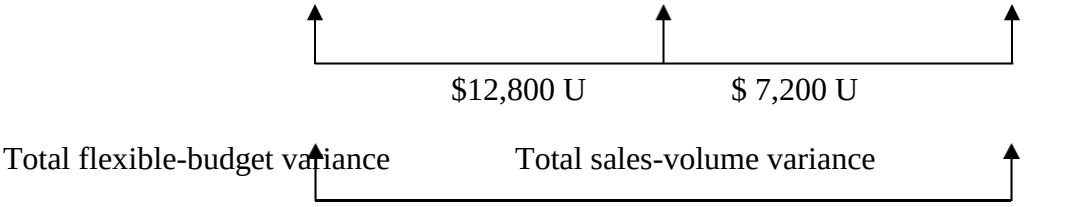
Part III: Workout

Q1.

Variance Analysis for Brabham Enterprises for August 2012

	Actual Results (1)	Flexible-Budget Variances (2) = (1) – (3)	Flexible Budget (3)	Sales-Volume Variances (4) = (3) – (5)	Static Budget (5)
Units (tires) sold	2,800[g]	0	2,800	200 U	3,000[g]
Revenues	$313,600[a]	$ 5,600 F	$308,000[b]	$22,000 U	$330,000[c]
Variable costs	229,600[d]	22,400 U	207,200[e]	14,800 F	222,000[f]

Contribution margin	84,000	16,800U	100,800	7,200 U	108,000
Fixed costs	50,000[g]	4,000 F	54,000[g]	0	54,000[g]
Operating income	$ 34,000	$12,800U	$ 46,800	$ 7,200U	$ 54,000



[a] $112 × 2,800 = $313,600

[b] $110 × 2,800 = $308,000

[c] $110 × 3,000 = $330,000

[d] Given. Unit variable cost = $229,600 ÷ 2,800 = $82 per tire

[e] $74 × 2,800 = $207,200

[f] $74 × 3,000 = $222,000

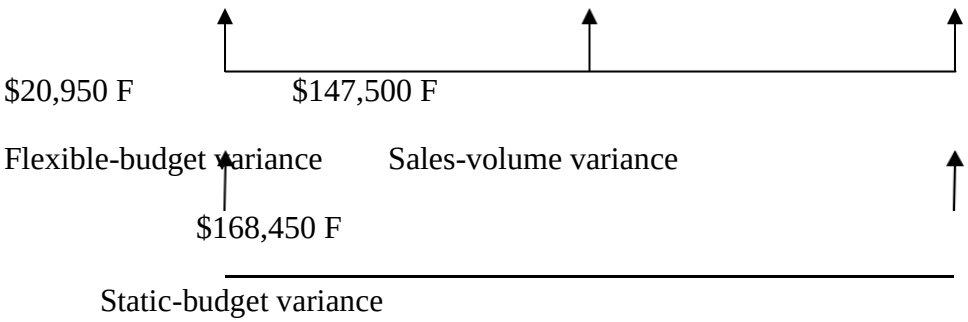
[g] Given

Q2.

1. Variance Analysis for Tuscany Statuary for 2011

	Actual Results	Flexible Budget	Flexible Budget	Sales Volume	Static Budget

	(1)	Variances (2) = (1) – (3)	(3)	Variances (4) = (3) – (5)	(5)	
Units sold	5,500[a]	0	5,500	500	6,000[a]	U
Direct materials	$ 668,800	$ 8,800 U	$ 660,000[b]	$ 60,000 F	$ 720,000[c]	
Direct manufacturing labor	952,750[a]	9,750 F	962,500[d]	87,500 F	1,050,000[e]	
Fixed costs	1,180,000[a]	20,000 F	1,200,000[a]	0	1,200,000[a]	
Total costs	$2,801,550	$20,950 F	$2,822,500	$147,500 F	$2,970,000	



[a] Given

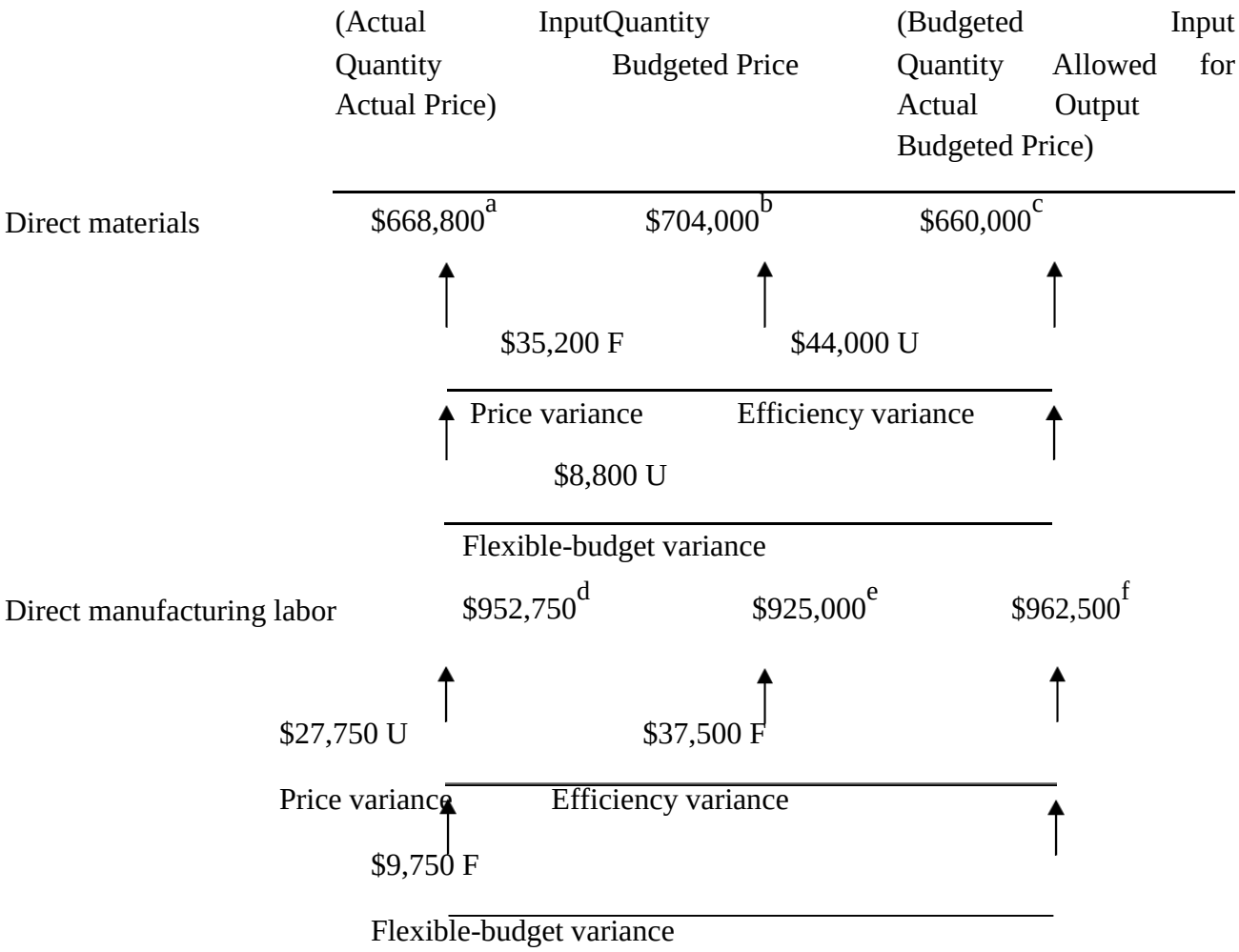
[b] $120/unit × 5,500 units = $660,000

[c] $120/unit × 6,000 units = $720,000

[d] $175/unit × 6,000 units = $1,050,000 2.

[e] $175/unit × 6,000 units =

Actual	IncurredActual	InputFlexible	Budget



[a] 70,400 pounds × $9.5/pound = $668,800

[b] 70,400 pounds × $10/pound = $704,000

[c] 5,500 statues × 12 pounds/statue × $10/pound = 66,000 pounds × $10/pound = $660,000

[d] 18,500 hours × $51.50/hour = $952,750

[e] 18,500 hours × $50/hour = $925,000

[f] 5,500 statues × 3.5 hours/statue × $50/hour = 19,250 hours × $50/hour = $962,500

CHAPTER FIVE

Part I: True/False/

1. True
2. True
3. False
4. False
5. True
6. True
7. True
8. False
9. True
10. True

Part II: Multiple Choices

1. D
2. C
3. B
4. A
5. A
6. C
7. B
8. D
9. B
10. D
11. C

Part III: Workout

1. Direct materials cost per unit ($262,500 7,500 units) = $35 per unit

Direct manufacturing labor cost per unit ($300,000 7,500 units) = $40 per unit

Variable cost per batch = $500 per batch

Award Plus' operating income under the alternatives of accepting/rejecting the special order are:

	Without One-Time Only Special Order 7,500 Units	With One-Time Only Special Order 10,000 Units	Difference 2,500 Units
Revenues	$1,125,000	$1,375,000	$250,000
Variable costs:			
Direct materials	262,500	350,000[1]	87,500
Direct manufacturing labor	300,000	400,000[2]	100,000
Batch manufacturing costs	75,000	87,500[3]	12,500
Fixed costs:			

Fixed manufacturing costs	275,000	275,000	—
Fixed marketing costs	175,000	175,000	—
Total costs	1,087,500	1,287,500	200,000
Operating income	$ 37,500	$ 87,500	$ 50,000

[1]$262,500 + ($35 2,500 units) [2]$300,000 + ($40 2,500 units) [3]$75,000 + ($500 25 batches)

Alternatively, we could calculate the incremental revenue and the incremental costs of the additional 2,500 units as follows:

Incremental revenue	$100 2,500	$250,000
Incremental direct manufacturing costs	$35 2,500 units	87,500
Incremental direct manufacturing costs	$40 2,500 units	100,000
Incremental batch manufacturing costs	$500 25 batches	12,500
Total incremental costs		200,000
Total incremental operating income from accepting the special order		$ 50,000

Award Plus should accept the one-time-only special order if it has no long-term implications because accepting the order increases Award Plus' operating income by $50,000.

If, however, accepting the special order would cause the regular customers to be dissatisfied or to demand lower prices, then Award Plus will have to trade off the $50,000 gain from accepting the special order against the operating income it might lose from regular customers.

2. Award Plus has a capacity of 9,000 medals. Therefore, if it accepts the special one-time order of 2,500 medals, it can sell only 6,500 medals instead of the 7,500 medals that it currently sells to existing customers. That is, by accepting the special order, Award Plus must forgo sales of 1,000 medals to its regular customers. Alternatively, Award Plus can reject the special order and continue to sell 7,500 medals to its regular customers.

Award Plus' operating income from selling 6,500 medals to regular customers and 2,500 medals under one-time special order follow:

Revenues (6,500 $150) + (2,500 $100)	$1,225,000
Direct materials (6,500 $35) + (2,500 $35)	315,000
Direct manufacturing labor (6,500 $40) + (2,500 $40)	360,000

Batch manufacturing costs (130[1] $500) + (25 $500)	77,500
Fixed manufacturing costs	275,000
Fixed marketing costs	175,000
Total costs	1,202,500
Operating income	$ 22,500

[1] Award Plus makes regular medals in batch sizes of 50. To produce 6,500 medals requires 130 (6,500 ÷ 50) batches.

Accepting the special order will result in a decrease in operating income of $15,000 ($37,500 – $22,500). The special order should, therefore, be rejected.

A more direct approach would be to focus on the incremental effects—the benefits of accepting the special order of 2,500 units versus the costs of selling 1,000 fewer units to regular customers. Increase in operating income from the 2,500-unit special order equals $50,000 (requirement 1). The loss in operating income from selling 1,000 fewer units to regular customers equals:

Lost revenue, $150 1,000	$(150,000)
Savings in direct materials costs, $35 1,000	35,000
Savings in direct manufacturing labor costs, $40 1,000	40,000
Savings in batch manufacturing costs, $500 20	10,000
Operating income lost	$ (65,000)

Accepting the special order will result in a decrease in operating income of $15,000 ($50,000 – $65,000). The special order should, therefore, be rejected.

Even if operating income had increased by accepting the special order, Award Plus should consider the effect on its regular customers of accepting the special order. For example, would selling 1,000 fewer medals to its regular customers cause these customers to find new suppliers that might adversely impact Award Plus's business in the long run.

2. Award Plus should not accept the special

order. Increase in operating income by selling 2,500 units

under the special order (requirement 1)	$ 50,000
Operating income lost from existing customers ($10 7,500)	(75,000)

Net effect on operating income of accepting special order $(25,000)

The special order should, therefore, be rejected.

CHAPTER SIX

Part I: True/False/

1. True
2. True
3. True
4. True
5. True
6. False
7. False
8. False
9. False
10. False

CHAPTER SEVEN

Part I: True/False/

1. False
2. False
3. False
4. False
5. False
6. True
7. True
8. True
9. True
10. True

Part II: Multiple Choices

1. D
2. E
3. D
4. C
5. A
6. D
7. A