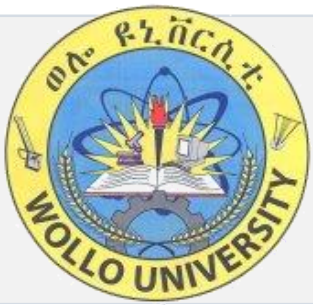

WOLLO UNIVERSITY
COLLAGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ACCOUNTING AND FINANCE

DISTANCE MODULE FOR DEGREE PROGRAM

COST AND MANAGEMENT ACCOUNTING PART II (ACFN2092)

Prepared By: Kedir Seid (MSc.)
Naod Mekonnen (MSc.)

Editor: Selamawit Lemech (MSc.)
Distance Education Program

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Wollo University
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ABOUT THE COURSE

Course Code	AcFn2092
Course Title	**Cost and Management Accounting II**
Degree Program	BA Degree in Accounting and Finance
Module	**Cost and** Management Accounting
ETCTS Credits	5
Credit Hour	3
Course Objectives & Competences to be Acquired	After successfully completing this course, the students should be able to: ▪ Explain the importance of cost- volume- profit analysis; ▪ Describe the benefit of budgeting and its application; ▪ Prepare a master budget; ▪ Prepare a flexible budget; ▪ Compute and interpret variances; ▪ Apply relevant costing to different decisions; ▪ Explain the methods of pricing; ▪ Explain the costs and benefits of decentralization.
Course Description	The course builds on the knowledge acquired from the course entitled cost and Management Accounting and introduces some new concepts and uses of accounting tools and techniques in the analysis, planning and control of business operations and management decision making processes. Topics covered include: intensive review of the management decision making processes and nature of management information, examination of concepts and rationale underlying managerial accounting managerial methods, the budgeting process and standard costing, the investment decision and quantitative methods of evaluation.
Evaluation Type	Weight
Assignment	35%
Tutorial Attendance	5%
Final exam	60%
Total	100%

CONTENTS

CHAPTER ONE: COST-VOLUME-PROFIT (CVP) ANALYSIS

Dear learners, after completing this chapter, you should be able to:

- ✓ Understand the cost volume profit (CVP) assumptions
- ✓ Distinguish between contribution margin and gross margin
- ✓ Explain Essential features of CVP analysis
- ✓ Determine break even point and out put to achieve target operating income
- ✓ Explain the use of CVP analysis in decision making and how sensitivity analysis can help managers cope with certainty
- ✓ Apply CVP analysis to a multi product company
- ✓ Apply CVP analysis to multiple cost driver situations

1.1. Introduction

In this unit you will be introduced with one of the most powerful management accounting toll that helps managers in quick decision about the income generated at different activity level. The tool is termed as Cost-Volume-Profit (CVP) Analysis, as the relationship among cost, profit and the volume of output or the level of activity is considered in the model.

Understanding the relationship between a firm's costs, profits and its volume levels is very important for strategic planning. When you are undertaking a new project, you will probably ask yourself, "How many units do I have to produce and sell in order to breakeven?" The feasibility of obtaining the level of production and sales indicated by that answer is very important in deciding whether or not to move forward on the project in question. Similarly, before undertaking a new project, you have to assure yourself that, you can generate sufficient profits in order to meet the profit targets set by your firm. Thus, you might ask yourself, "How many units do I have to sell in order to produce a target income?" Breaking Even? You could also ask, "If I increase my sales volume by certain percent, what will be the impact on my profits?" The topics in this unit are, therefore designed to acquaint you with the ability of applying Cost-Volume-Profit (CVP) Analysis in answering different questions while you are taking part in planning decision in different types of organizations.

Although the term "profit" is attached in the CVP model; it does not mean that, the application of CVP analysis is limited to business organizations only. It can be used by government and nongovernmental organizations (NGOs) as well in planning their activity levels in light of the recourse availability and constraints.

1.2. Meaning, Underlying Assumptions and Importance of CVP Analysis

1.2.1. Meaning

Examining shifts in costs and volume and their resulting effects on profit is called **cost-volume-profit (CVP) analysis**. This analysis is applicable in all economic sectors, including manufacturing, wholesaling, retailing, and service industries and not-for- profit (NFP) organizations. CVP can be used by managers to plan and control more effectively because it allows them to concentrate on the relationships among revenues, costs, volume changes, taxes, and profits.

CVP analysis can be used to determine a **company's break-even point (BEP),** which is that level of activity, in units or Birr value, at which total revenues equal total costs. At breakeven, the company's revenues simply cover its costs; thus, the company incurs neither a profit nor a loss on operating activities. Companies, however, do not wish merely to "break even" on operations.

The break-even point is calculated to establish a point of reference. Knowing **BEP,** managers are better able to set sales goals that should generate income from operations rather than produce losses. CVP analysis can also be used to calculate the sales volume necessary to achieve a **desired target profit**. Target profit objectives can be stated as either a fixed or variable amount on a before- or after-tax basis. Because profit cannot be achieved until the break-even point is reached, the starting point of CVP analysis is BEP. It also helps in conducting a **sensitivity** analysis to understand how the change in variables in the CVP model affects the profitability.

After going through the major assumptions upon which the CVP model is developed, you will be exposed through the application of CVP in determining the BEP, target profit; in a single and multiple product companies. You will also come across on how CVP is used to conduct a sensitivity analysis as well as its application in NFPs.

Notice that on advanced managerial accounting courses you will come across with diverse and advanced applications of CVP analysis in various financial and strategic decisions.

> ☞ ***Cost-volume-profit analysis determines how costs and profit react to a change in the volume or level of activity, so that management can decide the 'best' activity level.***

1.2.2. Underlying Assumptions of CVP Analysis

CVP analysis is a short-run model that focuses on relationships among several items: selling price, variable costs, fixed costs, volume, and profits. This model is a useful planning tool that can provide information on the impact on profits when changes are made in the cost structure or in sales levels. However, the CVP

model, like other human-made models, is an abstraction of reality and, as such, does not reveal all the forces at work. It reflects reality but does not duplicate it. Although limiting the accuracy of the results, several important but necessary assumptions are made in the CVP model. These assumptions follow.

1. All revenue and variable cost behavior patterns are constant per unit and linear within the relevant range.
2. Total contribution margin (total revenue - total variable costs) is linear within the relevant range and increases proportionally with output. This assumption follows directly from assumption 1.
3. Total fixed cost is a constant amount within the relevant range.
4. Mixed costs can be accurately separated into their fixed and variable elements. Although accuracy of separation may be questioned, reliable estimates can be developed from the use of regression analysis or the high-low method.

5. Sales and production are equal; thus, there is no material fluctuation in inventory levels. This assumption is necessary because of the allocation of fixed costs to inventory at potentially different rates each year. This assumption requires that variable costing information be available. Because both CVP and variable costing focus on cost behavior, they are distinctly compatible with one another.

6. There will be no capacity additions during the period under consideration. If such additions were made, fixed (and, possibly, variable) costs would change. Any changes in fixed or variable costs would violate assumptions 1 through 3.
7. In a multiproduct firm, the sales mix will remain constant. If this assumption were not made, no weighted average contribution margin could be computed for the company.
8. There is either no inflation or, if it can be forecasted, it is incorporated into the CVP model. This eliminates the possibility of cost changes.
9. Labor productivity, production technology, and market conditions will not change. If any of these changes occur, costs would change correspondingly and selling prices might change. Such changes would invalidate assumptions 1 through 3.

These assumptions limit not only the volume of activity for which the calculations can be made, but also the time frame for the usefulness of the calculations to that period for which the specified revenue and cost amounts remain constant. Changes in either selling prices or costs will require that new computations be made for break-even and product opportunity analyses.

The nine assumptions listed above are the traditional ones associated with CVP analysis. An additional assumption must be noted with regard to the distinction of variable and fixed costs. Accountants have generally assumed that cost behavior, once classified, remained constant over periods of time as long as operations remained within the relevant range. Thus, for example, once a cost was determined to be "fixed," it would be fixed next year, the year after, and 10 years from now.

The above assumptions thus, imply that cost-volume-profit analysis is always based on contribution per unit (assumed to be constant unless a question clearly says otherwise) and never on profit per unit because profit per unit changes every time a few more or less units are made.

Self test 1.1.

1. *Define CVP*

1.3. Applications of CVP Analysis

On the subsequent part of the module you will find an explanation and illustrations on the applications of CVP in different scenarios.

1.3.1. Break Even Analysis

CVP analysis has wide-range applicability. It can be used to determine a company's break-even point (BEP), which is that level of activity, in units or dollars/Birr, at which total revenues equal total costs. At breakeven, the company's revenues simply cover its costs; thus, the company incurs neither a profit nor a loss on operating activities.

☞ ***At the breakeven point total revenue is equal to total cost (both variable and fixed)***

For instance **Sebastopol Cinema** sold 4,800 tickets during a show one month run. The following contribution margined approach income statement show that the operating income for the month will be zero:

Sales Revenue (4800 X Br25) ---------- Br 120, 000
Less Variable Cost (4800 X Br 15) ---------- 72,000
Total Contribution Margin----------Br 48,000
Less Fixed Costs---------- 48,000
Operating Income----------**Br 0**

The income statement above highlights (1) the distinction between variable and fixed cost and (2) the total contribution margin, which is the amount that contributes towards covering Sebastopol Cinema's fixed cost and income generation. To state it differently, each ticket sold add Birr 10 to the firm's bottom line profit. The Birr 10 unit contribution margin is derived by deducting the unit variable cost Birr 15 from Birr 25 the unit selling price of a ticket.

How could you compute Sebastopol Cinema's breakeven point if you didn't already know it is Birr 4,800 tickets per month? Well on the following discussion you will get the basics of CVP analysis to determine BEP and other application. CVP analysis can be done using three alternative approaches, namely: contribution margin approach, equation approach and graphical approach.

In discussing CVP application we will assume that the following variables have the meanings given below:

- SP = Selling Price Per Unit
- Q = Units Produced and Sold
- VCU = Variable Cost Per Unit
- CMU=contribution margin per Unit
- CM%= contribution margin percentage (CMU÷SP)
- FC = Total Fixed Costs
- TOI =Target operating Income
- TNI=Target Net Income
- t = Tax rate

1.3.1.1. Equation Method

In using equation approach to CVP analysis, you need to convert your income statement in the following equation form.

Revenue –Variable Costs- Fixed Costs = Operating Income

Your Sales Revenue is equal to the number of units sold times the price you get for each unit sold:

Sales Revenue = SPQ

Assume that you have a linear cost function, and your total costs equal the sum of your Variable Costs and Fixed Costs:

Total Costs = Variable costs + Fixed costs

The profit equation can, therefore rewritten as:

(SPXQ) - (VCUXQ) + FC= OI

This equation provides the most general and easiest approach to remember approach to any CVP situation. The determination of breakeven level using this method can easily performed by making the operating income on the right hand side of the equation zero. Here the basic assumption is that, when you are at breakeven, your *Sales Revenue minus your Total Costs is zero*.

☞ ***At breakeven point,***

(SPXQ) - (VCUXQ) + FC = 0

From the information given above for the Sebastopol Cinema, you can determine the breakeven point (BEP) using the equation approach as follows,

$$(Br25 \times Q) - (Br15 \times Q) - Br48,000 = 0$$

$$Br10Q = Br\ 48,000$$

$$\underline{\mathbf{Q = 4,800}}$$

If Sebastopol sells fewer than 4800 tickets, it will have a loss, if it sells 4800 tickets, it will breakeven; and if the sales are more than 4800 units, it will make a profit.

The breakeven point stated in units can be stated in terms of Birr by multiplying the breakeven quantity and unit selling price. The breakeven point in Birr= BEQ x SP

$$= 4,800 \times Br25$$

$$= \underline{\mathbf{Br120,000}}$$

1.3.1.2. Contribution Margin Approach

The contribution margin technique is merely a short version of the equation technique. The formulas used in the determination of the breakeven point in unit as well as in value are derived by the rearrangement of the terms in the equation method above, which is

$$(SP \times Q) - (VCU \times Q) - FC = OI$$

Re-written equation takes the following format:

$$(SP\text{-}VCU) \times Q = FC + OI$$

That is, $Q = FC + OI / (SP\text{-}VCU)$

The difference between unit selling price and unit variable cost is termed as unit contribution margin. You can replace the (P-V) by the term "Contribution Margin per Unit (CMU),

$$\mathbf{Q = FC + OI/CMU}$$

As you know from the discussion above at breakeven point the target operating income is Birr 0, so replacing OI by 0, you will get,

$$\mathbf{Q = FC / (SP\text{-}VCU)}$$

A. Breakeven point in units using contribution Margin Approach

Breakeven point in units using this formula is determined by dividing the total fixed cost by the contribution margin per unit due to the fact that this approach centers on the idea that each unit sold provides a certain amount of fixed costs. When enough units have been sold to generate a total contribution

margin equals to the total expense and only after that point the units sold contributes for profit of the organization.

The breakeven number of tickets that Sebastopol Cinema must sold to reach at breakeven using this method can be determined as,

Q = FC/CMU

Q= Br48, 000/Br10

Q= 4,800 units

B. Determining breakeven point in terms of sales value (Dollar/Birr)

To find the breakeven sales value, you can use contribution margin percentage in place of contribution margin per unit in the formula you used in the determination of breakeven units. Contribution margin percentage is simply the ratio of contribution margin to selling price.

CM% = CMU/USP

It can also determined by dividing the total contribution margin to total sales when the unit selling price and variable cost is not known. We will see how this formula is used in such a situation later. Before that let see how the formula works using the above example.

CM % on our example of Sebastopol Cinema = UCM/USP

= Br 10/ Br 25

= **0.4**

This can be interpreted as, units sold cover variables costs and contribute 40 percent to cover fixed cost and increase in profit.

The break even sales amount (Birr) for Sebastopol Cinema = FC/CM%

= 48,000/0.40

= **Br 120,000**

The breakeven sales determined using equation method was a mere multiplication of the breakeven point in unit and the unit selling price (4800 units x Br 25) which is exactly the same with what you determined using a more complicated contribution margin approach.

☞ ***Why do you think using the contribution margin approach is essential?***

Well, sometimes you will be given only the income statement and asked to determine the breakeven sales without sufficient information about units selling price and unit variable cost. In this case, only using the contribution margin ratio you can determine the breakeven point in sales by dividing total fixed cost by CM ratio gives the break-even point in sales dollars.

For example, **Jimma Electronics Co**. produces portable radios. It has released the following Variable Costing Income Statement. This is the only financial information that we have regarding the company's operations:

Sales Revenue--------- 100,000
Less Variable Costs------30,000
Contribution Margin----- 70,000
Less Fixed Costs--------- 50,000
Operating Income ------- **Br 20,000**

What is the Break-Even point for Jimma Electronics Co? You do not know the number of units that Jimma Electronics sold in a year. You do not also know the Price or the Variable Cost per unit. Although you do not know the price or the Variable Cost per unit, you are still able to calculate the Contribution Margin Ratio.

Contribution ratio can be determined by dividing total contribution margin to total sales.

CM% in this case is, therefore, determined as follows:

= Br 70,000 ÷ Br 100,000 or 1- variable cost ratio
= **0.7 0r 70%** 1- (variable cost ÷ sales)
1-(30,000 ÷ 100,000)

0.7 Or 70%

The breakeven point in sales is also determined by dividing the total fixed cost by the contribution margin ratio determined above as follows:

= FC/CM%
= 50,000/0.7
=**Br 71,428.57**

Keep in mind the reason that Jimma Electronics' Sales Revenue is lower than it was before is because the company sold fewer units. Keeping the price and Variable Cost per unit remained unchanged. Let's check if Breaks Even at this Sales Revenue figure:

Sales Revenue: ---------- Br 71,428.57
Less Variable Costs (30% of 71,428.57) ---------- 21,428.57
Contribution Margin----------Br 50,000
Less Fixed Costs---------- 50,000
Operating Income ---------- **Br0__**

Self test 1.2.

1. *What is contribution margin, contribution margin per unit and contribution margin percentage?*

1.3.1.3. Graphical Approach

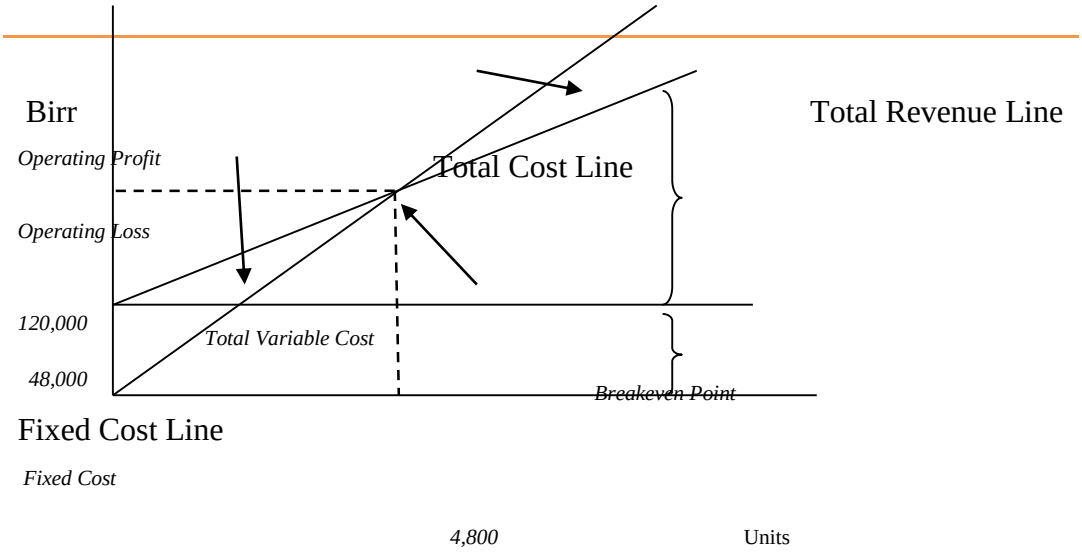
You have seen how solutions to break-even problems are determined using an algebraic formula. However, sometimes managers need information in more visual format, such as graphs. In this approach you can construct a CVP graph by plotting total cost and total revenue graph at different activity level. The breakeven point is found at the intersection point of total revenue and total cost lines.

The chart or graph is constructed as follows:

2. Plot fixed costs, as a straight line parallel to the horizontal axis
3. Plot sales revenue and variable costs from the origin
4. Total costs represent fixed plus variable costs.
5. The breakeven point represents the intersection point of total revenue and total cost lines

Now you can draw a CVP graph to Sebastopol Cinema following the steps given above and locate the breakeven point.

The



breakeven points for Sebastopol cinema can determined from the graph by identifying the level of output and sales value where the total revenue and total cost line cross to each other. In the case of Sebastopol cinema this happened when 4800 tickets are sold for birr 120,000 in which both the unit and the Birr value are similar with what have been determined in the equation and contribution margin approaches**.** The graphical approach is usually preferred by managers as it can provide a detail insight of the cost volume and profit relationship pictorially.

Self test 1.3.

1. *Assume that Bilen spring water plc. produces each 1 liter bottled water at a cost of Br. 5.24 and sells each units for Br. 8. The total fixed cost per a month is Br. 2,460.*

Required: *compute the breakeven point in quantity and in revenue using*

A. *Equation method*
B. *Contribution margin approach*

1.3.2. Target Operating Income Analysis

Using CVP analysis managers can determine the total sales in unit and Birr/Dollar needed to reach the target profit level. The computation of sales volume in unit and/ or in amount to attain the targeted profit is similar with that of the break even analysis, except that the targeted profit is more than offsetting the cost. For instance, the management of Sebastopol Cinema desires to get Br 9000 profit for the coming month, instead of operating at breakeven point, *how many tickets must be sold?* Managers want to answer this question to provide the necessary resource support to attain the desired profit at already determined volume of activity. The analysis can be performed using equation method or contribution margin approach on the basis of personal preference.

See both the methods using the information given for Sebastopol Cinema to determine the target sales in unit and Birr to that enable the firm to earn the targeted profit of birr 9,000 cab be determined using the equation method and contribution margin method as follows:

Equation Method to Determine (Target sales unit)	**Contribution Margin Approach (Target sales unit)**
(SP x Q) - (VCU x Q) -FC= TOI (25 x Q) – (15 x Q) - 48,000= 9000 10Q= 57,000 **Q= 5,700**	Q = FC +TOI/ CMU Q = (48,000 + 9,000)/10 **Q= 5,700**
Equation Method to Determine (Target sales in birr)	**Contribution Margin Approach (Target sales in birr)**
TR= SP x Q =25 x 5700 **= Br 142,500**	Target Sales in Birr = (FC + TOI)/CM% = (48,000 + 9000)/ 40% **= Birr 142, 500**

Bothe the methods provided similar result that the cinema must sell 5,700 tickets at a total of Birr 142, 500 to meet its target profit goal of birr 9000.

- ☞ ***Here you can recognize that each ticket sales beyond the breakeven point contributes to the firms operating income***.

1.3.3. The Impact of Income Tax on CVP Analysis

Profit seeking enterprises must pay tax on their profit, meaning that target income figures are set at high enough to cover the firm's tax obligation to the government. The relationship between an organization's before tax income and after tax income is expressed in the following formula:

After Tax income = Before Tax Income – Income Taxes

NIAT = NIBT- (NIBT x t)
= NIBT x (1-t)

Dividing both sides by (1-t) you can get:

NIAT/ (1-t) = NIBT

Which gives you the desired before tax income that will generate the desired after tax income, given the company's tax rate.

For instance, if the target profit given for Sebastopol Cinema above is expressed on after tax basis and the firm is subject to a 40 percent income tax rate, what will be the required sales of ticket in units and Birr? If you want to know how many units that you need to produce and sell in order to generate a target Net Income (or after-tax profit), just convert the after-tax number into a before-tax number.

NIBT = NIAT/ (1-t)
=Br 9000/ (1-0.4)
= **Br 15,000**

You can then substitute the before-tax profit figure in the formulas used in target operating income analysis. The analysis of sales of tickets and amount of Sebastopol cinema to earn the desired profit after tax can be determined using the equation and contribution margin approach as shown on the following table:

Equation Method to Determine (Target sales unit)	**Contribution Margin Approach (Target sales unit)**
(SP x Q) - (VCU x Q) -FC= TOIBT **(25 x Q) – (15 x Q) - 48,000= 15,000** **10Q= 63,000** **Q= 6,300**	Q = FC +TOIBT/ CMU Q = (48,000 + 15,000)/10 Q= 6,300
Equation Method to Determine (Target sales in birr)	**Contribution Margin Approach (Target sales in birr)**
TR= SP x Q =25 x 6300 **= Br 157,500**	Target Sales in Birr = (FC + TOIBT)/CM% = (48,000 + 15,000)/ 40% **= Birr 157, 500**

1.3.4. Margin of Safety

The margin of safety is the excess of the budgeted or actual sales over the breakeven sales level. This tells managers the margin between current sales and the breakeven point. In a sense margin of safety indicates the risk of losing money that a company faces; that is the amount by which sales can fall before the company is in the loss area. The margin of safety is determined using the following formula:

Margin of Safety = Sales Volume (Actual or Budgeted) - Breakeven Sales volume

As an example, conceder the case of Sebastopol Cinema, that planed to attain a Birr 9000 before tax profit at a sales volume of 5700 units or Birr 142, 500. The breakeven point for this company as determined on section 3 above is attained at the sales volume of 4,800 units or Birr 120,000. The margin of safety for this company is the difference between the budgeted sales and the breakeven sales, which is 900 units (5,700unite -4,800). The margin of safety in terms of sales value is also determined as Birr22, 500(Birr 142,500-Birr120, 000). The interpretation is that, sales volume of Sebastopol can drop by 1100 tickets or Birr 22,500 before the firm incurs a loss, if all other things remain constant.

In practice the margin of safety is determined in sales amount (Birr) and as a percentage of current sales. To determine the margin of safety in percentage the following formula can be used:

$$\textbf{Margin of Safety (\%)} = \frac{\textbf{Margin of safety in Birr}}{\textbf{Sales}}$$

For Sebastopol Cinema the margin of safety percentage is,

27,500/142,500

= 19.3%

Self test 1.4.

1. *Distinguish between operating income and net income*
2. *What is margin of safety*

1.4. Summary

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 in 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 cots.

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.

Answer for self test Questions

Self test 1.1.

Cost- Volume- Profit (CVP) Analysis is the examination of the relationships between cost, volume and profit. Thus, cost, volume and profits are the elements of CVP analysis.

Self test 1.2.

Contribution margin: is the difference between total revenues and total variable. It represents the amount of money available to cover fixed costs and to provide profits for the period.

Contribution margin = Total Sales – Total variable costs

Contribution margin can be expressed in terms of total, unit and percentage basis.

Contribution margin per unit: is the difference between the unit selling price and the variable cost per unit. It measures the amount by how much the contribution margin changes (increases or decreases) for each unit change in the quantity of units sold.

Unit contribution margin = unit selling price (P) – unit selling price (V)

Contribution margin percentage (ratio): is the percentage of contribution margin to sales. It measures the percentage by how much contribution margin changes for each birr change in sales revenue. It can be calculated as:

Contribution margin/sales or Unit contribution margin unit selling price

Self test 1.3.

A. At Breakeven point, ***(SPXQ) - (VCUXQ) + FC = 0***

= 8Q – 5.24Q - 2,460 = 0

= Br. 2.76Q = Br.2,460

Q = Br. 2,460/ Br. 2.76 **= 891 units**

Breakeven point in sales revenue: 891 units x Br. 8 selling price = **Br. 7,130.**

B. At Breakeven point, Q= FC/ (SP-VCU)

Q = Br. 2,460/ 2.76 = 891 units

The breakeven point in sales revenue is computed as FC/ CM%

Br. 2,460/ .345 = Br. 7,130

Self test 1.4.

1. Operating income is the difference between operating revenue and operating costs including cost of goods sold.

Operating income = Total revenues – Total costs

Whereas, net income is the final figure to be reported on income statement. It is operating income minus income taxes.

Net Income = Operating Income - Income taxes

2. The margin of safety is the excess of the budgeted or actual sales over the breakeven sales level. This tells managers the margin between current sales and the breakeven point.

1.5. Review Questions

PART I- True or False

Instruction, dear learners, please write true if the statement is correct and write false if the statement is wrong

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 managemen'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- Fill in the Blank Spaces
Instruction, Dear Learners, please fill in the blank spaces with appropriate words or phrases
1. ._____ examines the behavior of total revenues, total costs and operating income as changes occur in the output level, selling price, variable costs per unit or fixed costs.

2. In decision making process, any cost that differs among alternatives and will influence the outcome is a _____

3. The difference between operating revenue and operating costs including cost of goods sold is the _____

4. _____ is the difference between the unit selling price and the variable cost per unit.

5. _____ (also called contribution margin ratio) is the contribution margin per unit divided by the selling price

6. The _____ is that quantity of output where total revenues equal total costs-that is, where the operating income is zero

7. _____ is a **"What- if"** technique that managers use to examine how a result will change if the original predicted data are not achieved or if an underlying assumption changes.

8. _____ is the amount of budgeted revenues over and above breakeven revenues

PART III- Problems
Instruction, Dear Learners, please work out the following questions by showing the necessary steps Problem 1-1 Max Company produces a single product that it sells wholesale for $100 per unit. Variable costs per unit amount to $80 and total fixed costs are $100,000. Assume the applicable tax rate is 40%.

Required:

a. Find the break-even point in sales dollars.

b. Find the sales dollars needed to generate $20,000 in net income before taxes.

c. Find the sales dollars needed to generate $24,000 in net income after taxes.

d. Find the sales dollars needed to generate a 9% return on sales dollars after taxes.

e. Find the sales dollars needed to generate an 18% return on sales after taxes.

Problem 1-2 The VM Company produces and sells a line of Camcorders with a sales price and budgeted unit costs as follows:

Sales price……$600

Direct materials costs per unit……. 170

Direct labor costs per unit……. 50

Factory overhead costs:

Variable per unit ……..90

Total Fixed……400,000

Selling and Adm. Costs::

Variable per unit sold……. 30

Total Fixed……. 120,000

Required:

1. Determine VM Company's conventional linear break-even point in units

2. Assume a tax rate of forty percent. Using conventional linear cost volume profit analysis, determine the number of units that VM Company would have to produce and sell to generate net income of $78,000 after taxes.

3. Now suppose the company wants to earn 10% on sales revenue after taxes. Using conventional linear cost volume profit analysis, determine the number of units VM would need to be produce and sell to accomplish this goal

Answer for Review questions

Part I- Solutions

1.True
2.False
3.True
4.False
5. True
6. True
7. True
8. True
9. True
10.False

Part II- Solutions

1. Cost-volume profit (CVP) analysis
2. Relevant cost
3. operating income
4. Contribution margin per unit
5. Contribution margin percentage
6. breakeven point
7. Sensitivity analysis
8. Margin of safety
9. Sales mix
10. equation method

PART-III: PROBLEMS SOLUTIONS

PROBLEM 1-1

a) $ 500,000

b) $600,000

c) $700,000

d) $2000,000

e) Not feasible to earn a 18% on sale

PROPLEM 1.2

1) 2000 units

2) 2500 units

3) 3250 units

CHAPTER TWO: MASTER BUDGET AND RESPONSIBILITY ACCOUNTING

Dear learners, 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

This unit contains two different topics Master Budget and Responsibility Accounting. The first portion is about master budget which is an important management accounting tool for planning future activities and controlling current operation in the organization.

Budgets are crucial to the ultimate financial success of any organization. Budgets are so important, mainly because they serve as road map towards achieving organizational goals. Budgets as a management accounting tool helps management in planning, controlling and performance evaluation. In this unit you will study how budget is used in planning the operation of an organization.

2.2. Budgeting and Characteristics of Budgets

There are different types of organizations in today world. Generally these organizations can be divided as profit making organization and not for profit organizations. The main objective of profit making organization is making profit. There for in a for profit oriented company, decisions made by management are intended to increase or at least maintain profit. Success is measured to a significant degree by the amount of profit the organizations earn. A not for profit organization is an organization whose goal is something other than earning a profit for its owners. Usually its goal is to provide service. In not for profit organization, decisions made by management ordinarily are intended to produce the best possible service with the available resources.

Success in a not for profit organization is measured primarily by how much service the organization provided and by how well these services are rendered. Most basically, the success of a not for profit organizations is measured by how much it contributes to the public wellbeing.

Since service is vague and less measurable concept than profit, it is more difficult to measure performance in not for profit organization. Despite these complications, management must do what it can do to assure that resources are used efficiently and effectively.

Despite the difference in the objective of organization, all of them have to plan what they want to achieve. Planning is the process of establishing enterprise objective. There should be agreement among and all levels of management as to the objective of the company and the proposed means of accomplishing them.

Developing a budget is a critical step in planning any economic activity. This is true for business, for government agencies and for individuals. We must all budget our money to meet day to day expense and plan for the major expenditure, such as buying a car or paying for college tuition. Similarly, business of all types and government units at every level must make financial plans to carry out routine operation, to plan for major expenditure and to help in making financing decision.

Most people associate the word "budget" with the approving, rejecting or arguing over various budgets. Tax payers demand that governments plan the effective use of their hard earned tax dollars and budget not only allow government to plan spending , but also allow tax payers to see exactly where and how their many is being spent. Government and government agencies, however, tend to use budget only as a means of limiting spending. In contrast, most business organizations use budget to focus attention on company operation and financial not just to limit spending. Budget highlights potential problem and advantage early, allowing management to take steps to avoid these problems or use the advantages wisely. Thus, a budget is a tool that helps managers in both their planning and control function. A budget is a formal written summery (statement) of management plan for a specific future time period expressed in financial terms. It normally represents primary means of communicating agreed up on objectives throughout the business organization. Once adopted, a budget becomes an important basis of for evaluating performance. Thus, it promotes efficiency and serves as a deterrent to waste and inefficiency

2.2.1. Strategic Planning and its Implementation

Planning is the first function of management. It is performed continuously because the passages of time demand both re-planning and making new plans. More over current feedback often necessitates newly planned action to,

- Improve current performance deficiency
- Cope with unanticipated events that are unfavorable, and
- Take advantage of new development

Management planning is a process that includes the following five stapes

1. Establish enterprise objective and goals
2. Developing premise about the environment of the entity
3. Making decision about course of action
4. Initiating actions to activate the plans

5. Evaluating performance for re planning

The development of organization objectives is the most fundamental level of the planning process. Objective states the desired, broad, long range future state of the organization .For example, the objective for a manufacturing Company should relate to such basic issue as breadth of the product line, quality of a product, growth expectations etc. The next planning level is known as goals, which represent the broad objective brought in to sharper focuses by explicitly specifying

- The time dimension for attainment
- Quantitative expression and
- Subdivision of responsibility

For example, goals would explicitly state such items as the following. Three years from now the new product being developed will be introduced. The return on investment goal for the next year will be 15% and the profit goal of product A is 5% of sales for next year. To establish the foundation for the attainment of the enterprise objective and specific goals, management must develop strategies to be pursued by the entity.

Strategy specify the "how'; they detailed the plan of attack to be used in pursuing the goals operationally. For example, the strategy for a company may include expanding the current sales territory, reducing the selling price to attract higher volume, increasing the advertising and financing the expansion with debt rather than equity.

Finally, the most detailed level of planning occurs when management operationallize the objective, goals and strategies already established by incorporating them in the budget. A budget is a financial and narrative expression of the expected result from the planning decision.

2.2.2. Budget and the Budget Cycle

Most people associate the word "budget" with the approving, rejecting of resource spending. If we associate budget with the government activities, governments usually request their various agencies to prepare their resource requirement so as to examining and approve the reasonableness and importance of the budget. Once the approved, the budget then will be used as a blue print for the agencies activities and means of controlling and limiting their spending.

In contrast, most business organizations use budget to focus attention on their companies' operation and financial implication of their planned operation; not just to limit spending. Budget highlights potential problem and advantage early, allowing management to take steps to avoid these problems or use the advantages wisely.

Thus, a budget is a tool that helps managers in both their planning and control function. A budget is a formal written summery (statement) of management plan for a specific future time period expressed in financial terms. It normally represents primary means of communicating agreed up on objectives throughout the business organization. Once adopted, a budget becomes an important basis for evaluating performance. Thus it promote efficiency and serves as a deterrent to waste and inefficiency

- ***Budget in brief is a future plan of action expressed in quantitative terms which is also an aid to management control and performance evaluation***

Budget can cover both financial and non financial aspects of the plan that can serve as blue print for the organization to follow in an upcoming period. A budget covers financial aspects and quantities of management expectation regarding income, cash flows, and financial position. Like financial statements present the historical financial condition and operating results of the business, budgeted balance sheet, cash flow and income statement are also prepare to show the future financial condition and operational performance. Budgeted financial statements are usually supported by detail schedule of the various operation of the firm, so budget also include nonfinancial aspects of the plan such as units of output to be produced and sold, number of employee and working hours, etc.

Budget is a cyclical and sequential activity. In a well managed companies, budget usually cycles through the following steps:

1. Planning the performance of the company as a whole, as well as planning the performance of its subunits (such as department or divisions). Managers at all level agree on what is expected.
2. Providing a frame of reference, a set of specific expectations against which actual results can be compared
3. Investigating variations from plans. If necessary, corrective action follows investigation
4. Planning again, in light of feedback and changed condition.

Self test 2.1. *Define the term budget precisely?*

2.2.3 Advantages of Budgets

Budget prepared as a formal business plan is used by all managers at different functional areas and managerial level. Further budget is used by all types of organizations, be it a business organization, government organization or NGO. When administered wisely budget can provide the following benefits:

i. Efficient Allocation of Resources

Resource available to meet the objective of any organization is generally limited; therefore efficient allocation of recourse is one of the prerequisite for successful attainment of organizational goal. For example, an office of a city Administration must allocate its revenue among basic societal service such as security and protection, heath, education, infrastructure etc. In the case of business organizations, the well designed business strategy hardly become successful without availability and efficient allocation of resource. Therefore, adopting formal budgetary process helps organization to identify the resource requirement of the planed activity and allocate in accordance to the priority of each operation in achieving organizational objective.

ii. Compel strategic planning and implementation of plans

The budgeting process forces managers to plan ahead. The development of budget triggers managers to plan their operation ahead as well as to prepare on the ways of talking any change during the implementation of the plan.

Budget enable the successful implementation of strategy that is why in most business organization budget is considered as an integral part of strategic planning and implementation.

iii. Facilitating coordination and communication

For any organization to be effective, each manager throughout the organization must be aware of the plan made by other managers. In large and diverse organizations, the problem of coordination becomes critical. An important role of budgeting is to improve the coordination among the various units of the organization. Planning or budgeting means establishing objectives in advance and identifying the steps by which the objectives are to be accomplished. The planning process initiates coordination and clarification of sub-goals to achieve major enterprise goals. The coordinated plan or budget provides a blue print for implementation and control.

- ***A good budgeting process facilitates communication in all direction in the organization and help coordinating the various resources, manpower and units of the organization so that goal of the organization is achieved.***

iv. Frame work for judging performance

Once plans are in Place, Company's performance can be measured against the budget established for those plans. Budget can overcome two limitations of using past performance as abases of judging

actual results. one limitation is that past results incorporate past misuse and sub standard performance and the other limitation of using past performance is that the future conditions may be expect to differ from the past.

- ☞ ***As a performance evaluation basis budgeted performance are better than actual results.***

V. Motivating Managers and Employees

Research shows that budgets that are challenging improve performance. An inability to achieve budget numbers is viewed as filer. Most individuals are motivated to work more intensely to avoid failure than to achieve success. As individuals get closer to goal they work harder to achieve it. For this reason many executives like to set challenging but achieve goal for their subordinates .Creating attitude of anxiety improves performance, but overly ambitious and unachievable budget increase anxiety without motivation that is because individuals see little chance of avoiding.

Self test 2.2. 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.

2.2.4. Types of Budget and Budgeting Techniques

The type of budget used by different organization differs based upon the nature of their business and the purpose of the budget; however, the general frame work is the same. In this section we will try to see the different type of budget their advantage and disadvantage and in what circumstance organizations prefers to adopt a specific type of budget and budgeting techniques.

(1) **Strategic Plan:** The most forward looking budget is the strategic plan, which sets the overall goals and objective of the organization. Some organization won't classify the strategic plan as an actual budget though because it does not deal with a specific time frame and it does not produce forecasted financial statement. In any case, the strategic plan leads to long range planning which produce forecasted financial statement for five or ten years. The financial statements are estimates of what management would like to see in the company's future financial statement.

Decisions made in long range planning include addition or deletion of department, acquisition of a new equipment or building and other long term commitment.

(2) **Capital Budget:** Capital budget is a budget that details the planned expenditure for facilities, equipment, new product, and other long-term investments.

(3) **Master budget:** A master budget is a short-term, comprehensive plan to achieve the financial and operational goals of an organization. Master budget comprises of the organizations overall plan for the given period and the budget for the various functional areas the make up the organization.

☞ ***Long rang plane and budget gives an organization a direction and goals for the future while short term plane and budget guide the day to day operation. Both long term and short term budgets are relevant for archiving the overall goal of an organization, so managers are advised to give a reasonable attention to both short and long term budgets.***

Managers who pay attention to only short term budget will quickly lose sight of long term goals similarly managers who pay attention to only the long term budget could wind up mismanaging day to day operation. There has to be a happy medium that allows managers to pay attention to their short term budget while still keeping an eye on long term plan.

Master budget can be prepared as a standalone for one year or one operating cycle or in a continuous basis. Continuous budget or rolling budget or revolving budget are a very common form of a master budget that simply add a month in the future as the month just ended is dropped. Budgeting thus becomes an ongoing instead of periodic process. Continuous budgets for managers to allow think about the next twelve months not just the remaining month in fixed budgeting cycle. As they added a new twelfth month to continuous budget, managers may update the other month as well. They can compare actual monthly result with both the organization plan and the most recent revised plan. Continuous budgeting approach in preparing master budget is adapted mostly when the business environment is volatile to coup up with the change.

Different organizations prepare budget using different techniques that may be grouped as follows:

(1) **Incremental budgeting**: is a budget set based on past year's actual performance. In this technique a budget for the coming year is simply this year budgeted or actual results plus or minus some amount for expected change on planned operation or change in the market price. This budgeting technique is easy and widely used, however it has its own draw back. As the base is the current year performance or budget any anomaly in the current year performance or budget may be incorporated in the budget.

(2) **Zero based budgeting**: In a dynamic business it often makes sense to 'start afresh' when developing a budget, rather than basing ideas too much on past performance. In this technique each budget is therefore constructed without much reference to previous budgets. Preparing a budget afresh is usually required in most business organizations, where the business environment is volatile that require continues effort of incorporating changes in budget thinking.

(3) **Rolling budgets**: Given the speed of change and general uncertainty in the external environment, shareholders seek quick results. US companies typically report to shareholders every three months, compared with six months in the UK. Rolling budgets involve evaluating the previous twelve months' performance on an ongoing basis, and forecasting the next three months' performance.

(4) **Strategic budgeting:** This involves identifying new, emerging opportunities, and then building plans to take full advantage of them. This is closely related to zero based budgeting and helps to concentrate on gaining competitive advantage.

(5) **Activity based budgeting**: This examines individual activities and assesses the strength of their contribution to company success. They can then be ranked and prioritized, and be assigned appropriate budgets.

2.3. Budgeting in Business Organization

2.3.1. Introduction

The type of budget and the extent of the budgeting activity vary considerably from organization to organization. In smaller business organization, there may only be a sales forecast, a production budget or a cash budget, larger organization generally prepare a master budget or a comprehensive budget.

A master budget involves the development of a complete set of financial statement for the budget period with supporting schedule. The primary responsibility for developing a master budget is given to the controller and her or his staff. In large organization, a special budget committee will be formed.

The budget committee is usually composed of several key executive from various segment of the organization. People from finance, sales, purchasing, production, engineering and accounting are usually represented. The procedure followed by this committee in developing the budget is largely determined:

- By the authority it has over the finance budget
- By the amount of participation it allows from others within the organization.

The authority of the budget committee is determined by top management philosophy; top management may have a predetermined profit objective in mind and will look to the budget as a means to accomplish

it. This objective may be stated in variety of ways, such as rate of return on net asset, earning per share, or a specific amount of net income. It may be based on operating results of previous years adjusted for expectations about the coming year or some desired level of profitability. When top management has a predetermined profit objective, the budget committee must recognize it and develop a budget that will achieve it.

If top management has no specific profit level in mind, the budget committee must first develop some nation about what is fair and reasonable expectation for the budget period without this, the budget process often turn in to "game" and much of the benefit is lost.

The budget committee may or may not invite other members in the organization to participate in developing the budget. In estimating sales for the coming period, for example, sales people may be asked to project the number of units of each product they expect to sell in their territories.

The sales representative on the budget committee would use these as a basis for developing the sales forecast for the entire company participation could be carried to the extreme and every person in the organization could asked to estimate productivity in her or his individual area. On the other extreme, the budget committee may allow no participation. It merely may develop a budget that will achieve the desired profit and pass it on as the standard of performance for the budget period. More will be said about the behavioral considerations associated with employee participation in developing the budget.

2.3.2. Process of Developing a Budget

Although each organization is unique in the way it puts together its budget, all budgeting process share some common elements. After organizational goals, strategies, and long range plans have been developed, work begins on the master budget, a detailed budget for the coming fiscal year with some detail.

The master budget is a comprehensive financial plan for a business. It is made up of the Operating and Financial budgets, which are in turn made up of supporting schedules (budgets).

To envision the master budget process, picture the financial statements most commonly prepared by companies: The income statement, the balance sheet, the cash flow statement. Then imagine the preparation of these statements before the fiscal period operational period.

2.3.2.1. Parts of A Master Budget

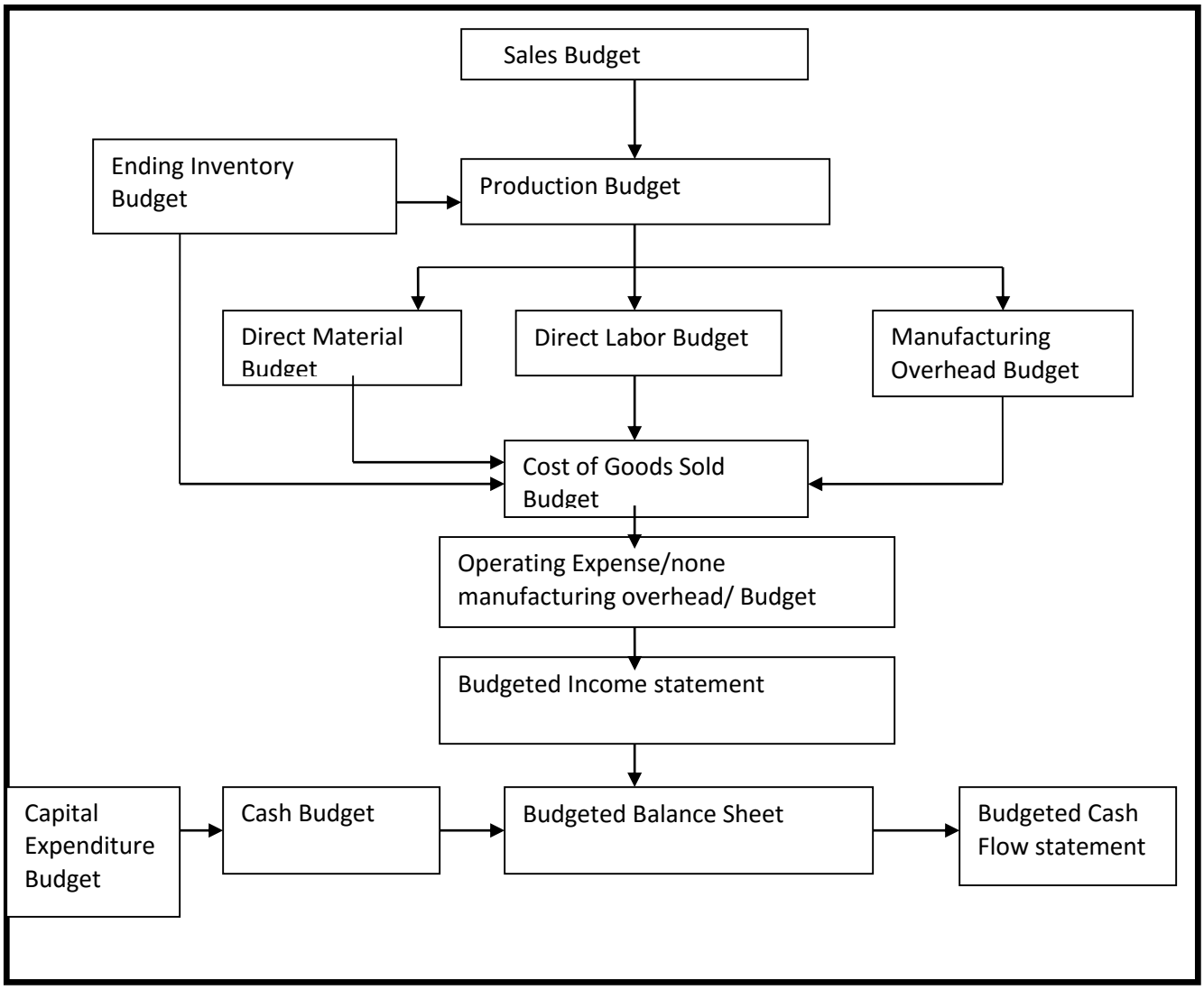
- ***What are the parts of a master budget?***

As shown on figure on the next page master budget consists of two major parts, namely: the operating budget and financial budget.

i **Operating budget** refers to the budgeted income statement and the supporting budget schedules for various business functions in the value chain. The operating budget basically shows the expected operating result of the organization in the upcoming operational period.

ii **The financial budget** is part of the master budget made up of the capital expenditures budget, the cash budget, the budgeted balance sheet, and the budgeted statement of cash flow.

An Overview of a Master Budget



2.3.2.2. Steeps in Budget Development

☞ ***Dear learners, from the above parts of this unit you have seen how budget is useful in an organization, the types of budget and budgeting techniques. As you all understand in most business organizations there is a formal process of preparing budget for the coming fiscal in the form of a comprehensive master budget. If you are asked to prepare a master budget how can you start? Is it the operating budget or the cash budget that must be prepared? What are the relevant data and how they are processed and result the final master budget?***

Well, on the following section you are provided with answer for the above questions with illustrative examples

2.3.2.2.1. Steps in developing an operating budget

The Operating Budget refers to the budgeted income statement and all the supporting schedules.

One way to think about this question is to understand that the organization has more control over some aspects of the business (for example how much to produce) and less control over other aspects, (the demand for its product and service).

For most organizations sales is uncertain. Therefore, beginning with sales forecast, the firm can plan the activities over which it has more control. As better information about sales becomes available, it is reasonably easy to adjust the rest of the budget. If, on the other hand, production is more uncertain than sales, the firm may want to begin with a raw material and production forecast so as to reduce the uncertainty related to production.

To clearly understand the steps in development of an operating budget, conceder the budget information gathered by the controller of Gibe Furniture Manufacturing company during the process of budgeting for the upcoming fiscal year, 2011.

The summary of required budget information obtained from different operating units, such as sales related information from the marketing department, production related information from production department, direct and indirect labor related information from the human resource department, and other manufacturing and non manufacturing overhead budgets from other departments as well as assumptions taken for the development of an operating budget are given as follows:

(1) The only source of revenues is sales of tables and unit sold is the only revenue driver.
(2) Work in Process inventory is negligible and is ignored.
(3) Unit costs of direct materials purchased and finished goods sold remain unchanged throughout each budget year.
(4) There are two types of Direct materials : Lumber and Metal
(5) There are two types of direct labor: Laminating labor and Machine labor.
    Direct labor rates remain unchanged throughout each budget year.
(6) For computing inventor able costs, Gibe Furniture allocates all manufacturing overhead costs using manufacturing labor hours as the allocation base.
(7) Numerical information
    (a) Each table has the following product specifications:

Direct materials:

Lumber---------- 9 board feet/table
Metal---------- 10 board feet/table

Direct labor:

Laminating labor------0.25Hrs/table

Machine labor---------3.75 Hrs/table

(b) Inventory information in physical units for 2011.

	Beginning Inventory	Target Ending Inventory
Direct materials:		
Lumber----------	20,000 board feet	18,000 board feet
Metal----------	25,000 board feet	22,000 board feet
Finished goods:		
Tables----------	5,000 tables	3,000 tables

(c) Revenue expected from sales of tables for 2011 are:

Selling price----------Br. 392/table

Units' sales---------- 52,000 tables

(d) Costs expected for 2011.

	2010	2011
Lumber/ board feet -------	Br. 3.90	Br. 4.00
Metal/ board feet----------	5.80	6.00
Laminating labor/ Hr. ----	24.00	25.00
Machine labor/ Hr. -------	29.00	30.00

(e) Other budgeted costs and amounts for 2006 are:

- Variable non-manufacturing costs---------- 13.5% of sales
- Fixed non-manufacturing costs---------- Br. 1,400,000
- Variable MOH costs---------- Br. 9.50/DL Hr.
- Fixed MOH costs---------- Br. 1,600,000

(f) The inventor able cost is Br.275/table in 2005.

Now you can see each step in the preparation of the operating budget using the budget information given above.

Step 1: Preparing Revenue budget

The starting point for operating budget development for most business organizations is a revenue budget. A revenue/Sales budget outlines the expected sales for each product in units and Birr. This budget will be developed after the firm made a forecast of the demand for the company's product by taking into account.

Difficulties in forecasting sales

Sales budget is developed based on the sales forecast. A sales forecast is a formal prediction of the quantities expected to be sold in the budget period and the price at which the expected volume of sales to be sold." A sales forecast is based upon a variety of interlocking factors. It is the foundation of the entire master budget. The accuracy of estimated production schedules and of costs to be incurred depends on the detail ness and accuracy of the forecasted sales both interms of monetary unit, and quantity. Without forecasts of expected sales for the budget period a firm would not know how many units to produce and

could easily manufacture too many units or too few units which may lead to overstocks or lost sales and hence customers. Moreover, costly mistakes can be made by purchasing unnecessary materials and hiring employees.

The sales budget is the crucial foundation of the master budget. The major factors affecting sales forecast are price policy, the general economic outlook, conditions within the industry, governmental policies and the position of the company in the economy.

Methods used in forecasting sales vary widely from firm to firm. Each firm has specific characteristic which influence the method to be employed- The method (technique) could vary from simple, estimates based on past experience to sophisticated statistical approaches and computer model. whichever method is used, some prediction must be made concerning how many units of each product can be sold and at what unit selling price for the budget period. Some of the inputs for sales forecasting are discussed in the following paragraphs.

Past pattern of sales - Sales from past periods can be broken down by product lines, regions and sales people to provide a basis for estimating possible future sales. From thorough study of past period sales, sometimes a pattern can be observed which guides to the would be sales amount. For example during summer sales is always at peak for the year. Such seasonal variation in the level of sales is very helpful in forecasting future sales. Different statistical tools can be employed here. Such statistical methods are the high-low method, the regression analysis method, the time series analysis method, the fitting curve method, and so on.

Estimates made by sales men- Since sales force has close relation (contact) to the customers and sales activity, they may have reasonable estimate for the budget period. The sales person prepares sales estimates for the budget period in light of his /her knowledge of the past and his expectations for the future.

General economic conditions and competitive conditions - The higher level management who are better informed with respect to the total economic picture consider these inputs in the estimates made by sales men. The general price level, the state of inflation, and other economic conditions like boom, recoveries etc. are considered in developing the final sales forecast.

Results of market researches- the results of market survey help managers in determining the potential demand available and the market capacity. Markets studies show customers preference for a particular product and may reveal which product is more attractive than the other. Other factors such as advertising and promotion budgets change in price and specific interrelationship of sales and economic indicators

such as gross domestic product (GDP) and industrial price indexes are important input factors in sales forecasting.

Based upon the forecasted sales the budgeted sale is prepared by a mere multiplication of forecasted sales volume and selling price.

Budgeted Sales = Budgeted sales volume X Budgeted Selling price

The Revenue budget for Gibe Furniture, based upon budget information 7(C) is,

Schedule (1) Sales Budget

Budgeted Unit	52,000tables
X Budgeted Unit Selling Price	Br 392/table
Budgeted Sales	Br. 20,384,000

Self test 2.3. *The Microtable Company produces and sells special wood tables that are used with microcomputers. The budgeted sales price is $250 per table. Sales are budgeted as 90%credit sales and 10% cash sales. Past experience indicates that 80% of credit sales are collected during the month of sale,*

17% are collected in the following month, and 3% are uncollectible. A 1% cash discount is allowed to all customers (cash or credit) who pay within the month the sale takes place.

The net sales dollars budgeted for February:

a. *$1,250,000 b. 1,240,000 c. 1,241,000 d. 1,239,750 e. None*

Step 2: preparing the production budget (in units)

After the revenues are budgeted, you would then prepare a Production Budget. The production budget is prepared to show how many units must be produced in order to meet your budgeted sales need and the target level of ending inventory balance for finished goods.

The total number of budgeted production requirement, is therefore, the sum of budgeted sales in unit and target ending inventory. However, if the firm is not new in operation, usually some of its production requirement can be satisfied using the inventory kept of the beginning of the period. Therefore, the banging in vestry should be deducted from the total production requirement to determine the exact units in the production budget

Formula wise you can put the production budget in unit as follow:

Budgeted Production in unit = Budgeted sales in unit + Target Finished Goods inventory - Begging Finished goods inventory

The production budget for Gibe using the given information is prepared as follows

Schedule (2) Production budget

Budgeted unit sales	52,000
Add: Target Finished Goods Inventory	3,000
Total requirements	55,000
Less: Beginning FG Inventory	5,000
Units to be produced	**50,000**

After the sales and production budgets have been developed and the efforts of the sales and production groups have been coordinated, the next stage is the development of the production costs (direct material, direct labor and manufacturing overheads) at budgeted output level.

Self test 2.4. *Considering the example given for microtable company and assuming that desired ending finished goods are based on 15% of next periods budgeted unit sales, budgeted units tables to be produced for February:*

a. 5,000 b. 4,970 c. 5,030 d. 5,780 e. None

Step 3: Preparing the Direct Material Usage and Direct Material Purchase Budget

The number of units to be produced calculated in production budget Schedule is the key to computing direct materials in quantity and Birr. The direct materials budget ties the production to the Direct Materials that will need to be purchased in order to produce the estimated units. Direct materials purchases needed for the budget period are determined using this equation:

Required Material Purchase	**=**	**material to be Used in Production**	**+**	**Estimated ending materials inventory**	**-**	**Estimated beginning materials**

The direct material usage budget in our case is prepared as follows:

Schedule 3A: DM Usage Budget

	Lumber	Metal	Total
Physical Units Budget:			
Lumber: 50,000 x 9 board feet	450,000b.f		
Metal: 50,000 x 10 board feet			500,000b.f
To be used in production	450,000b.f		500,000b.f
Cost Budget:			
-Available from Beginning Inventory.			
Lumber: Br. 3.90 x 20,000	Br. 78,000		
Metal: Br. 5.80 x 25,000			Br. 145,000
-To be obtained from purchases			

Lumber: Br. 4.00 x 430,000 Br. 1,720,000

Metal: Br. 6.00 x 475,000 Br. 2,850,000

DM to be used ***Br. 1,798,000 Br. 2,995,000 Br. 4,793,000***

Schedule 3B: DM Purchases Budget

Lumber Metal Total

Physical Units Budget:

Production Budget	450,000b.f	500,000b.f
Add: Target End. Inv.	18,000b.f	22,000b.f
Total requirements	468,000b.f	522,000b.f
Deduct: Beg. Inv.	20,000b.f	25,000b.f
Units to be purchases	448,000b.f	497,000b.f

Cost Budget:

Lumber: Br.4.00 x 448,000 Br. 1,792,000

Metal: Br. 6.00 x 497,000 Br. 2,982,000

Purchases Br. 1,792,000 Br. 2,982,000 Br. 4,774,000

Self test 2.5. *Considering the example given for microtable company and assume that 20 board feet of direct material is required to produce each tables , the price per a board feet of direct material is Br. The number of board feet of direct material to be purchased for the budgeted units of 5,030 tables .*

100,600 b. 101,110 c. 100,170 d. 101,030 e. Some other amount

Sep 4: Preparation of direct manufacturing labor cost budget

This budget will show the number of employee and total hours required in producing the budgeted level of output along with the cost. The costs in this budget usually depend on wage rate, production method and human resource plan.

Schedule 4: DL Budget

Laminating LaborMachine Labor Total

Labor-hours Budget:

Laminating: 50,000 tables x 0.25Hrs. 12,500Hrs.

Machine: 50,000 tables X 3.75Hrs. 187,500Hrs.

Total DL Hrs. required 12,500Hrs.187,500Hrs. 200,000Hrs

Cost Budget:

Machine: Br. 25/Hr. x 12,500Hrs. Br. 312,500

ML: Br. 30/Hr. x 187,500Hrs. Br. 5,625,000

Total DL cost Br. 312,500 Br. 5,625,000 Br. 5,937,500

Step 5: Preparing Manufacturing Overhead (MOH) Budget.

The Overhead budget shows the expected cost of all indirect manufacturing items. The total of these costs depends on how individual overhead costs vary with respect to the cost driver.

Gibe Furniture treats both variables MOH and fixed MOH as inventorable costs.

Schedule 5: MOH Budget

At the budgeted level of 200,000 DL-Hours

Total variables MOH [Br.9.50 x200, 000]	Br. 1,900,000
Total fixed MOH	Br. 1,600,000
Total MOH	Br. 3,500,000

Gibe Furniture inventories MOH at the budgeted rate of Br. 17.50/DL Hr. [i.e. Br.3, 500,000/200,000Hrs.]. The budgeted MOH cost per table is Br. 70 [Br. 3,500,000/50,000tables].

Step 6: Preparing the Ending Inventory Budget

This budget is prepared for target ending raw material and ending finished goods inventory

Schedule 6A: Computation of Unit Costs of Ending Inventory of FG

Cost/unit of	**Input**	**Input**	**Total**
DIRECT MATERIAL:			
Lumber:	Br. 4 /b.f	9 b.f	Br. 36
Metal:	Br. 6 /b.f	10b.f	Br.60 Br. 96.00
DIRECT LABOR:			
Laminating Labor	Br. 25 /Hr.	0.25Hrs.	Br. 6.25
Manufacturing Labor	Br.30 /Hr.	3.75Hrs.	Br.112.50 Br. 118.75
MOH	Br. 17.5/Hr.	4.00Hrs.	Br. 70.00
Total			Br. 284.75

Step 7: Preparing Cost of goods sold (CGS) budget

The following are inputs to prepare cost of goods sold budget

- Direct material usage budget
- Direct labor budget
- Manufacturing overhead budget
- Ending and beginning finished goods inventory
- Ending and beginning working in process inventory

Schedule 7: CGS Budget

Beg. FG Inv., Jan1, 2006 (275 x 5000) Br. 1,375,000

DM Used (sch.3A)	4,793,000	
DL (Sch. 4)	5,937,500	
MOH (Sch. 5)	3,500,000	
CGM		14,230,500
Cost of goods available for sale		15,605,500
Less: Ending FG Inv. (sch.6B)	854,250	
CGS		Br. 14, 751, 25

Step 8: Preparation of None Manufacturing overhead Cost Budget

The non manufacturing cost budget include the marketing and administrative departments' costs required to operate the company at its projected level of sales and production and to achieve long term company goals. Unless there is a change in the organizations production and sales or level of activity, the nonmanufacturing cost budget is easily prepared by taking previous year's actual or budgeted result after making the necessary adjustment for price change and otter similar changes between periods.

Schedule 8: Operating Expenses Budget

Variable non-manufacturing costs: 13.5% X 20,384,000	Br. 2,751,840
Fixed non-manufacturing costs	1,400,000
Total Operating Expense	4,151,840

Step 9: Preparing the Budgeted income Statement

The last effort in operational budget development is pulling all the budget schedules prepared in all the above steps in to the income statement. The budgeted income statement, which can also be called Performa income statement show the revenue costs of production, operating cost and the resulting operational profit envisage in the budget period.

BUDGETED INCOME STATEMENT

Revenues (Sch. 1)	Br. 20,384,000
Less: CGS (Sch. 7)	14,751,250
Gross Profit	5,632,750
Less: Operating Expenses (Sch. 8)	4,151,840
Operating Income	**Br. 1,480,910**

2.3.2.2.2. Financial Budgets

The remaining budgets that appear in the Master Budget make up the Financial Budget. The Financial Budget typically consists of the capital expenditure budget, the Cash Budget, the Budgeted Balance Sheet and the budgeted statement of cash flows. In this section the focus is only on the cash budget and

budgeted balance sheet, as the rest are discussed in detail in other course modules in financial accounting and financial managements.

i) **Cash budget**

Cash budget is a schedule of expected cash receipt and disbursement. It predicts the effects on the cash position at the given level of operation. Cash budget helps to avoid unnecessary idle cash and unexpected cash deficiencies. They thus, keep cash balance in line with needs, ordinarily; the cash budget has the following main sections.

The beginning cash balance plus cash receipt equals the total cash available before financing.

Cash receipts depend on the collection of accounts receivable, cash sales, and miscellaneous recurring sources such as rental royalty receipts. Information on expected collectable of account receivable is needed for accurate prediction.

Cash disbursement: Organizations make cash disbursement for various reasons such as:

- Payment for direct martial purchased
- Salary paid for direct labor cost and other wages
- Other disbursements for property, equipment and other long term investment
- Interest on long term borrowing
- Income tax payment
- Others,

Short time financing requirement depends on how the total cash available for needs compare with the total cash disbursement plus the minimum ending cash balance desired. If there is a deficiency of cash, loan will be taken, if there is excess cash, an outstanding loan will be paid

Suppose **Gibe Furniture Company** had the balance sheet for the year ended December 31, 2010 as follows:

ASSETS		**LIABILITIES & STOCKHOLDERS' EQUITY**	
		Liabilities	
Cash	Br. 500,000	Account payable	Br. 384,000
Accounts Receivable	1,881,600	Tax payable	20,460
Direct Materials Inventory	223,000	Total current	404460
Finished Goods Inventory	1,375,000	Long term debt	2,400,000
Land	1,200,000	Total current & Liability	2,804,460
Buildings & Equipment	2,300,000	**Stockholders' Equity**	
Accumulated Depreciation	(800,000) 1,500,000	Common Stock	3,000
		Retained earnings	3,872,1403,875,140
Total Assets	**Br. 6,679,600**	Total Liabilities & SHE	**Br. 6,679,600**

The quarterly cash flow based on the budgeted cash effects of the operation formulated in operating budget above is given below:

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cash Collection	Br. 5,331,200	Br. 4,704,000	Br. 4,704,000	Br. 6,272,000
Disbursements:				
Direct Materials	960,000	1,152,000	1,152,000	1,536,000
Payroll	1,626 300	1,626 300	1,888,600	1,626,300
Other costs	1,580,460	1,580,460	1,580,460	1,580,460
Equipment purchase	- 0-	-0-	1,800,000	-0-
Interest expense	60,000	60,000	60,000	60,000
Income tax	100,000	120,460	100,000	100,000
Total	**Br. 4,326,760**	**Br. 4,539,220**	**Br. 6,581 060**	**Br. 4,902,760**

Additional information

- Long term debt is Br. 2.4 million at an annual interest rate of 10% with 60,000 interest payable every quarter
- The company wants to maintain a Br. 100,000 minimum cash balance at the end of each quarter
- The company borrows cash in multiple of Br. 1,000 at the beginning of each quarter and repayment is made at the end of each quarter
- The company can borrow or repay money at an interest rate of 12% per year.
- Management doesn't want to borrow any money more short term cash than is necessary
- Interest is computed and paid when the principal is repaid
- Tax rate is assumed to be 36%.
- During the year the company paid Br. 420,640 income tax. This amount is the remaining due for the year 2010, plus four quarter payment of each Br. 100,000
- Equipment amounting Br. 1,800,000 was bought in the 3rd quarter
- No land is bought or sold.
- Depreciation for the year is Br. 500,000.
- Long term notes payable is not repaid.
- No dividend is paid.

To prepare a cash budget you need to get adequate information about the cash receipt and disbursement made by the organization during the budget period. Most of this information is obtained from the different schedules prepared for the operating budget parts of a master budget. In addition to cash receipts and payments for operational activities, information is required on planned investing and financing activity of the firm on the budget period. Information on the companies desired minimum cash balance is also required.

1. The ending balance of cash in one quarter is the beginning balance of cash for the next quarter.
2. In the year for total column the receipt and disbursement are totaled for the four quarters, however the beginning balance in the column is the beginning balance in the column are the beginning balance in for quarter 4.
3. Depreciation is not a cash disbursement,

4. The cash receipt and disbursement for operational activity appears in all the quarter as the budgeted operation of the company will continue in without interruption. However when you come to cash receipt and disbursement for investing and financing activities appears only on some of the quarters. For example the firm acquired fixed asset costing Birr 1,800,000, that is why the cash disbursement for investing activity appears only once in Q3.

5. When you cash receipt and payments related to financing activity the firm borrowed Birr 308,000 to finance the expected short term cash shortage at quarter III, as a result cash receipt from financing activity appeared only in this quarter. The principal amount and the interest on borrowed money are paid at quarter IV when the firm has excess cash on hand beyond the required amount of cash for planned payments and minimum cash balance requirement of the quarter, as a result cash payment for financing activity appears only in the fourth quarter.

Using all the information given above on illustration to the cash budget for Gibe Furniture can be prepared as follow:

Cash Budget for Gibe Furniture

Descriptions	Quarters				Total for the year
	I	**II**	**III**	**IV**	
Cash balance at the beginning	Br 500,000	Br 1,504,440	Br 1,669,220	Br 100,160	500,000
Add Receipts:					
Cash collection from customers	5,331,200	4,704,000	4,704,000	6,272,000	21,011,200
Total Cash available for needs (X)	**5,831,200**	**6,208,440**	**6,372,220**	**6,372,160**	**21,011,200**
***Deduct Disbursements*:**					
Direct materials	960,00	1,152,000	1,152,000	1,536,000	4,800,000
Payroll	1,626,300	1,626, 300	1,888,600	1,626,300	6,767,500
Other costs	1,580,460	1,580,460	1,580,460	1,580,460	6,321,840
Interest cost(long term debts)	60,000	60,000	60,000	60,000	240,000
Machinery purchase#	0	0	1,800,000	0	1,800,000
Income tax	100,00	120,460	100,000	100,000	420,460
Total cash Disbursement(Y)	**4,326,760**	**4,539,220**	**6,581,060**	**4,902,760**	**20,449,800**
Minimum Cash Balance desired	100,000	100,000	100,000	100,000	100,000
Total Cash needed	**4,426,760**	**4,639,220**	**6,681,060**	**4,902,760**	**20,349,800**
Cash excess (deficiency)	1,404,440	1,569,220	(307,840)	1,369,440	1,061,400
Financing					
Borrowing at the beginning	0	0	308,000	0	308,000
Repayment at the end	0	0	0	(308,000)	(308,000)
Interest at 12% per annum	0	0	0	(18,480)	(18,480)
Total effect of financing	0	0	308,000	(326,484)	(18,480)
Ending cash balance	**Br1,504,440**	**Br 1,669,220**	**Br100,160**	**Br1,142,920**	**1,142,920**

Self test 2.6. *Considering the example given in* ***Self test 2.3.*** *for microtable company, the* cash collections budgeted for February:
$ 891,000 b. 1,186,875 c. 1,014,750 d. 908,125 e. None

ii) The Budgeted Balance Sheet

The budgeted balance sheet shows the financial position of the firm during the budget period.Each item in the budgeted balance sheet is projected in the light of the details of the business plane expressed in all the previous budget schedules.

The budgeted balance sheet of Gibe furniture prepared on the bases of previously developed budget is prepared as follows:

Budgeted Balance Sheet of Gibe furniture

Assets		
Cash	Br1,142,920	
Accounts Receivable	1,254,400	
Direct Materials	204,000	
Finished Goods	854,250	Br 3,455,570
Property plant and equipment		
Land	1,200,000	
Building & Equipment 4,100,000 Ac.Depreciation(1,300,000)	2,800,0004,000,000	
Total Assets		**7,455,570**
Liabilities and Stock Holders' Equity		
Current liabilities		
Account Payables	358,000	
Income Tax payables	40,075	398,075
Long term Debt(interest 10% per year)		2,400,000
Stock Holders Equity		
Common Stock	3,000	
Retained earnings	4,654,4954,657,495	
Total Liabilities & SHE		**Br 7,455,570**

iii) **Budgeted statement of cash flow**: statement of cash flow presents cash flow from operating, investing and financing activity in detail.

iv) **Capital budgeting**: is the process of making long term planning decision for investment capital budgeting also called long term investment. Long term investment involves the commitment of resource for projects which have long term consequence. Such decisions usually involve large investment of money. Capital budgeting decision have uncertain actual outcome that have long-term

effect on the organization. Poor long-term investment decision can affect the future stability of an organization because it is often difficult for organization to recover money tied up in bad investment. Mangers need a long term planning tool to analyze and control investment with long-term consequence.

2.4. Responsibility Accounting

Responsibility accounting is an underlying concept of accounting performance measurement systems. The basic idea is that large diversified organizations are difficult, if not impossible to manage as a single segment, thus they must be decentralized or separated into manageable parts. These parts or segments are referred to as responsibility centers. An underlying concept of responsibility accounting is referred to as controllability. Conceptually, a manager should only be held responsible for those aspects of performance that he or she can control.

The purpose of a responsibility accounting system is to ensure that each manager and worker in an organization strives towards the overall goals set by top management. The basis of a responsibility accounting system is the designation of each sub-unit in the organization as a particular type of responsibility center. A responsibility center is a sub-unit in an organization whose manager is held accountable for specified financial and non-financial results of the sub-unit's activities. Thus, responsibility accounting is a system that measures the plans and actions of each responsibility center.

There are four common types of responsibility centers:

- Cost centers,
- Revenue centers,
- Profit centers, &
- Investment centers.

(i)**Cost center** is an organizational unit whose manager is responsible for costs only. Examples: Production Department of Manufacturing Companies.

(ii) **Revenue center** is a responsibility center whose manager is held accountable for the generation of revenues. Examples: Sales departments, marketing departments, etc

(iii) **Profit centers** are sub-divisions of a business assigned responsibility for both costs and revenues. Example: - A restaurant of a large hotel

(iv) **Investment centers** accountable for costs, revenues and the profitable utilization of invested capital. Example: Divisions of large companies.

The performance of each responsibility center is summarized periodically on a performance report. A performance report shows the budgeted and actual amounts key financial results appropriate for the type of responsibility center involved. Performance reports also typically show the variance between budgeted

and actual amounts for the financial results conveyed in the report. The data in performance report help managers use MBE (Management by Exception) to control an organization's operations effectively. MBE means that managers follow up on only the most significant variances between budgeted and actual results. This allows managers to use their time most effectively.

2.5. Budget Administration

Large organization use a formal process to collect data and prepare a budget such organization usually designate a budget director or chief budget officer. The budget director specifies the process by which budget data will be gathered, and prepare budgets. To communicate budget procedure and deadlines to employees throughout the organization, the budget director often develops and disseminates a budget manual. The budget manual says who is responsible for the required and what form the information to take

A budget committee consisting of key senior executives is often appointed to a device the budget director during preparation of the budget. The authority to give final approval to a budget usually belongs to the broad of directors in business organizations or board of trustees in many nonprofit organizations; usually the board has a subcommittee whose task is to examine the proposed budget carefully and recommend approval or any changes deemed necessary. By exercising its authority to make changes in the budget and grant final approval, the board of directors or trustee, can wield considerable influence on the overall direction the organization takes

2.5.1. Behavioral impact of Budget

There is no other area where the behavioral implication is more important than in budgeting area. A budget affects virtually every one in an organization: those who prepare the budget, those who use the budget to facilitate decision making, and those who are evaluated using budget. The human reactions to the budgeting process can have considerable influence on an organization

2.5.1.1. Budgetary Slack: padding the budget

The implication up on which a budget is based comes largely from people throughout an organization. For example, the sales forecast relies on market research and analysis by market research staff but also incorporates the projection of sales personnel. If territorial sales manager's performance is evaluated on the basis of whether the sales budget for the territory is exceeded, what is the incentive for the sales manager in projecting sales? The incentive is to give a conservative, or cautiously low sales estimate. The sales manager's performance will look much better in the eye of top management when a conservative

estimate is exceeded than when an ambitious estimate is not met. At least that is the perception of many sales managers, and in the behavioral area perception is what counts most.

When a supervisor provides a departmental cost projection for the budgetary purpose, there is an incentive to overestimate costs when the actual cost incurred in the department proves to be less than the inflated cost of projection, the supervisor appears to have managed in cost effective way.

This illustration is example of padding the budget. The budget padding means under estimating revenue or overestimating costs. The difference between the revenue or cost projection that a person provides and a realistic estimate of the revenue or cost is called budgetary slack.

For example, if a plant manager believes the annual utility cost will be Br.18, 000, but gives a budgetary projection of Br.20, 000, the manager has built Br.200 of slack in to the budget.

☞ ***Why do people pad budget with budgetary slacks?***

There are three primary reasons. First people often perceive that their performance will look better in their supervisor eyes if they can beat the budget. A second budgetary slack is often used to cope with uncertainty. A department supervisor may feel confident in the cost projection for 10 cost items. However, the supervisor may also feel that some unforeseen event during the budgetary period could result in unanticipated cost. One way of dealing with that unforeseen event is to pad the budget. If some negative event does occur, the supervisor can use the budgetary slack to absorb the impact of the event and still meet the cost budget. The third reason why cost budgets are padded is that budgetary cost projection is often cut in the resource allocation process. Thus, we have a vicious circle, budgetary projection are padded because they will likely be cut and they are cut because they are likely to have need padded

First, it can avoid relying on the budget as negative evaluate tool. if a department supervisor is harassed by the budget director or some other top manager every time a budgetary cost projection is exceeded, the likely behavioral response will be to pad the budget. In contrast, if the supervisor is allowed some managerial discretion to exceed the budget when necessary there will be tendency toward budgetary padding. Second managers can be given incentive not only to achieve budgetary projections but also to provide accurate projection.

2.6. Summary

1. The master budget summarizes the financial projections of all the organizations 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.

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

3. 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.

4. A responsibility center is a part, segment, or subunit of an organization, whose manager is accountable for a specified set of activities. Four major types of Responsibility centers are cost centers, revenue centers, profit centers, and investment centers. Responsibility accounting systems measure the plans (by budgets) and actions (by actual results) of each responsibility center.

5. Controllable costs are costs that are primarily subject to the influence of a given manager of a given responsibility center for a given time span. Performance reports of responsibility-center managers, however, often include costs, revenues, and investments that the managers cannot control. Responsibility accounting associates financial items with managers on the basis of which manager has the most knowledge and information about the specific items, regardless of the manager's ability to exercise full control. The important question is who should be asked, not who should be blamed.

2.7. Review Questions

1. Serra Furniture is an Elite desk manufacture. It manufactures two products.

1. Executive desks – Oak desks
2. Chairman desks – Red Oak desks

The budgeted direct cost inputs for each production in 2008 are as follows:

Particulars	**Executive line**	**Chairman line**
Direct material:		
Oak top	16Sqf	-----
Red Oak top	---	25Sqf
Oak legs	4 legs	----

Red Oak legs	--	4 legs
Direct Labor:	3 Hr	5 Hr

Unit data pertaining to the direct materials for March 2008 as follows:

Actual beginning direct material's inventory (2008)

Particulars	**Executive line**	**Chairman Line**
Oak top	320 Sqf	-----
Red Oak top	---	150 Sqf
Oak legs	100 legs	----
Red Oak legs	--	40 legs

Target ending direct material inventory at March 31, 2008.

Particulars	**Executive line**	**Chairman Line**
Oak top	192Sqf	-----
Red Oak top	---	200Sqf
Oak legs	80 legs	----
Red Oak legs	--	44 legs

Unit cost data for direct cost inputs pertaining to February 2008 and March 1998 are:

Particulars	**February 1998**	**March 1998**
Oak top (per sqf)	Bir.18.00	Bir.20.00
Red Oak top (per sqf)	Bir.23.00	Bir.25.00
Oak top (per leg)	Bir.11.00	Bir.12.00
Red oak legs (per leg)	Bir.17.00	Bir.18.00
Manufacturing labor (per Hr)	Bir.30.00	Bir.30.00

Manufacturing overhead (both variable and fixed) is allocated to each desk on the basis of budgetary direct manufacturing labor hours per desk. The budgeting variable manufacturing overhead rate for March 1998 is Bir.35.00 per Direct manufacturing labor Hour. The budgeted fixed manufacturing overhead for March 1998 is Bir.42, 500. Both variable and fixed manufacturing overhead cost is allocated to each unit of finished goods.

Data relating to finished goods inventory for March 1998 are

Particulars	**Executive line**	**Chairman Line**
Beginning inventory	20 units	5 units
Beginning inventory	Bir.10, 480	Bir.4850
Target ending inventory	30 units'	15 units

Budgeted sale for March 1998 are 740 units of the executive line and 390 units of the chairman line. The budgeted selling prices per unit in March 1998 are Bir.1, 020 for an executive line desk and Bir.1600 for a chairman line desk.

Take the following assumptions in your answer:

a) Works in Process inventories are negligible and ignored.
b) Direct material inventory and finished goods inventory are determined using the FIFO method.
c) Unit costs of direct material purchased and finished goods are constant in March 1998.

Required:

Prepare the following budget for March, 2008

1. Revenue budget
2. production budget in units
3. Direct material usage budget and direct material purchase budget
4. Direct manufacturing labor budget
5. Ending inventory budget
6. Cost of goods sold budget

Answer for self test Questions

Self test 2.1. **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.

Self test 2.2. ***E.***

Self test 2.3. D

Self test 2.4. C

Self test 2.5. D

Self test 2.6. B

Answer for review Questions

Part II solutions for work out questions
Solution: 1

(1) Revenue Budget for the year ended March31, 2008

Budgeter Revenue = Budgeted Sales in unit X Budgeted Selling Price

(1)	**(2)**	**(3)**	**(2)x(3)=(4)**
Revenue	**Units**	**selling price**	**Total Revenue**
Executive line	740	1020.00	754,800
Chairman line	390	1,600.00	624,000

(2)Production Budget in units for the year ended March31, 1998

Budgeted Production = Budgeted sales + Target finished goods inventory – Beginning finished goods inventory.

Executive line Budgeted production= 740+30-20 =750 units

Chairman Line Budgeted production=390+15-5 =400 units

(3) Direct material usage budget & Direct material purchase Budget:

a).Direct material Usage budget in units and Birr, at end of the year March 31, 2008.

Particulars	**Oak Top**	**Oak legs**	**Red oak top**	**Red oak legs**
Direct material used in				
Production of executive l				
Line (750x16) (750x4)	12,000	3000	----	------
Direct material used in				
Production of chairman				
Line (400x25) (400x4)	----	-----	10,000	1,600
Total Direct material				
Used (Sqf& Legs)	12,000	3,000	10,000	1,600
Less: Beginning				
Inventory (FIFO)	320	100	150	40
Cost direct material to used				
From purchases	11,680	2,900	9,850	1,560

Costs	**Executive line**		**Chairman line**	
A) Beginning Inventory:	Oak top	Oak leg	Red top	Red leg
1) Square feet's & Legs	320	100	150	40
2) Cost per Square				

Feet's & Legs (In Birr.)	20.00	12.00	25.00	18.00
3) Cost (1x2) (In Birr.)	6,400	1,200	3,750	720
B) Direct material to be used				
From current purchase:				
1) Square feet's & Legs	11,680	2,900	9,850	1,560
2) Cost per Square				
Feet's & Legs (In Birr.)	20.00	12.00	25.00	18.00
3) Cost (1x2) (In Birr.)	233,600	34,800	246,250	28,080
C) Total cost of Direct Material				
To be used (A3 + B3)	240,000	36,000	250,000	28,800

b) Direct material purchase budget:

	Executiveline		**Chairman line**	
	Oak top	**Oak leg**	**Red top**	**Red leg**
Direct material to be used in				
Production (Sqf& legs0	12,000	3,000	10,000	1,600
Add: Target ending Material				
Inventory:	192	80	200	44
Total Requirement:	12,192	3,080	10,200	1,644
Less: Beginning inventory				
Of Direct material (sqf&legs)	320	100	150	40
1) Direct material to be				
Purchased (Sqf * legs)	11,872	2,980	10,050	1,604
2) Cost per Sqf * legs (Birr)	20.00	12.00	25.00	18.00
3) Total direct material				
Purchase cost (In Birr)(1x2)	237,440	35,760	251,250	28,872

So Total Direct material purchase cost = 237,440 + 251,250 + 28,872 =Birr. 553,322

(4) Direct manufacturing labor Budget:

1	**2**	**3**	**2x3=4**	**5**	**5x4=6**
Particulars	**production**	**direct labor**	**total labor**	**labor**	**total**
	In units	**Hours/unit**	**Hours**	**rate/Hr**	**cost**
Executive line	750	3	2,250	30.00	67,500
Chairman line	400	5	2,000	30.00	60,000
Total			4,250		127,500

5) Manufacturing overhead budget at 4,250 labor Hours:

a) Variable Overhead costs:

1	**2**	**3**	**2x3=4**
Particulars	**Direct labor Hr**	**Variable overhead** Cost per Hour	**Total variable** cost
Executive line	2,250	Bir.35.00	78,750
Chairman line	2,000	Bir.35.00	70,000
Total variable over head cost			148,750
b) Fixed manufacturing Overhead cost			42,500
c) Total manufacturing overhead cost (a+b)			191,250

6) Ending inventory Budget at March 31, 2008.

1	2	3	2x3=4
Particulars	Sqf& Legs	Cost per Sqf& legs	Costs
a) Direct material ending:			
Oak top	192	Bir.20.00	3,840
Oak legs	80	Bir.12.00	960
Red Oak top	200	Bir.25.00	5,000
Red Oak legs	44	Bir.18.00	792
Total costs			10,592

b) Finished goods ending inventory

1	2	3	2x3=4
Particulars	Units	Cost per unit	Costs
Executive line	30	Bir.593.00	17,790
Chairman line	15	Bir.1, 072.00	16,080
Totals			33,870

Total ending inventory budgeted cost (a+b) = 10.592 + 33,870= Bir.44, 462

Notes: computation of cost per unit of finished goods inventory in 1998.

Particulars	cost per unit	Executive line			Chairman line		
			Input	amount		input	amount
A) Direct materials:							
Oak top	Bir.20.00	units	16	Bir.320.00		---	-----
Oak legs	12.00		12	48.00		---	---
Red oak top	25.00				units	25	Bir.625
Red oak legs	18.00		---	---		4	72
b) Manufacturing labor	30.00		3	90.00		5	150

c) Manufacturing O.H					
(See 5th requirement)	45.00	3	135.00	5	225
d) Total cost per unit			593.00		1,072.00

6) Cost of goods sold budget

Particulars	Costs	Total Costs
a) Beginning Finished goods inventory		15,330
b) Cost of goods manufactured:		
Direct material used	554,800	
Direct manufacturing labor	127,500	
Direct manufacturing Overheads	191,250	873,550
c) Cost of goods available for sale (a+b)		888,880
Less: ending finished goods inventory		33,870
Cost of goods sold		855,010

CHAPTER THREE: FLEXIBLE BUDGET AND STANDARDS

Dear students, when you have finished studying this chapter, you should be able to:

- Describe the difference between a static budget and a flexible budget
- . Develop a flexible budget and compute flexible-budget variances and sales-volume variances
- Compute the price and efficiency variances for direct-cost categories
- Explain why standard costs are often used in variance analysis
- Explain similarities and differences in the planning of variable overhead costs and the planning of fixed overhead costs
- Compute variable overhead spending and efficiency variances
- Explain how the efficiency variance for a variable indirect-cost item differs from the efficiency variance for a direct-cost item
- Compute the budgeted fixed overhead rate
- Explain two caveats to consider when interpreting the production-volume variance as a measure of the economic cost of unused capacity

3.1. Introduction

Dear learners in the previous unit you have studied the benefit of budget as a planning tool. Hence, budgets are planning tools that 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. In this unit, therefore the discussion focuses on how budget are used to evaluate feedback and variances aid managers in their control function. In evaluating performance the budgeted performance are compared with actual operational results and the resulting variance will be examined so as to identify the causes for variance on the bases of which performance can be rewarded for favorable variance or corrective actions will be taken to avoid unfavorable variance on the coming operational periods.

The unit highlights the importance of variance analysis and show how the budget initially prepared at planning stage creates problem while comparing actual results with the budget. In this unit you are also introduced with the advantage of flexible budget over the static budget, steps in the preparation of flexible budget and evaluating performance using flexible budget.

3.2. Standard Cost Systems

3.2.1. Meaning of Standard Costing

Standard costs are predetermined costs that are usually expressed on per unit basis. In other word, standard cost is a predetermined calculation of how much costs should be incurred under specified working condition. It is built up from an assessment of the value of direct material, direct labor and overhead items.

3.2.2. Why Standard Cost Systems Are Used

A standard cost system has three basic functions: collecting the actual costs of a manufacturing operation, determining the achievement of that manufacturing operation, and evaluating performance through the reporting of variances from standard. These basic functions result in six distinct benefits of standard cost systems.

Clerical Efficiency

A company using standard costs usually discovers that less clerical time and effort are required than in an actual cost system. In an actual cost system, the accountant must continuously recalculate changing actual unit costs. In a standard cost system, unit costs are held constant for some period. Costs can be assigned to inventory and cost of goods sold accounts at predetermined amounts per unit regardless of actual conditions.

Motivation

Standards are a way to communicate management's expectations to workers. When standards are achievable and when workers are informed of rewards for standards attainment, those workers are likely to be motivated to strive for accomplishment. The standards used must require a reasonable amount of effort on the workers' part.

Planning

Planning generally requires estimates about the future. Managers can use current standards to estimate future quantities and costs. These estimates should help in the determination of purchasing needs for material, staffing needs for labor, and capacity needs related to overhead that, in turn, will aid in planning for company cash flows. In addition, budget preparation is simplified because a standard is, in fact, a budget for one unit of product or service. Standards are also used to provide the cost basis needed to analyze relationships among costs, sales volume, and profit levels of the organization.

Controlling

The control process begins with the establishment of standards that provide a basis against which actual costs can be measured and variances calculated. Variance analysis is the process of categorizing the nature (favorable or unfavorable) of the differences between actual and standard costs and seeking explanations for those differences. A well-designed variance analysis system captures variances as early as possible, subject to cost-benefit assessments. The system should help managers determine who or what is responsible for each variance and who is best able to explain it. An early measurement and reporting system allows managers to monitor operations, take corrective action if necessary, evaluate performance, and motivate workers to achieve standard production.

Decision Making

Standard cost information facilitates decision making. For example, managers can compare a standard cost with a quoted price to determine whether an item should be manufactured in-house or instead be purchased. Use of actual cost information in such a decision could be inappropriate because the actual cost may fluctuate from period to period. Also, in making a decision on a special price offering to purchasers, managers can use standard product cost to determine the lower limit of the price to offer. In a similar manner, if a company is bidding on contracts, it must have some idea of estimated product costs. Bidding too low and receiving the contract could cause substantial operating income (and, possibly, cash flow) problems; bidding too high might be uncompetitive and cause the contract to be awarded to another company.

Performance Evaluation

When top management receives summary variance reports highlighting the operating performance of subordinate managers, these reports are analyzed for both positive and negative information. Top management needs to know when costs were and were not controlled and by which managers. Such information allows top management to provide essential feedback to subordinates, investigate areas of concern, and make performance evaluations about who needs additional supervision, who should be replaced, and who should be promoted. For proper performance evaluations to be made, the responsibility for variances must be traced to specific managers.

3.2.3. Budgetary Control vs. Standard Costing

Budgetary control and standard costing are comparable system of cost accounting in that they are both predetermined of forward – looking. The common objective is of controlling business operations by establishing predetermined targets. However, there are a few differences between these two systems are which given below:

Budgetary control system	Standard costing system
1. Budgetary control is related to all types of items of revenue and expenditure, whether they belong to the product or not, i.e. to all types of business activities. Hence, it is more extensive. 2. Budget is based on past experience and in most cases a projection of financial accounts. 3. Budgets are comparatively less rigid and 'should be' estimates. They fix limits. 4. Budgetary control can be operated without a standard costing system. It can be adopted in part. 5. The study of variances is not a subject of special study as in the case of standard costing	1. Standard costing is related to production and production costs. Hence, it is more rigorous and intensive. 2. Standard is established on the basis of technical estimates. It is the projection of accounts. 3. Standard are very rigid and 'ought to be' estimates. They fix targets. 4. Standard costing system cannot operate well without a budgetary control system. Also, it is not possible to operate the system in parts 5. Variance analysis is a subject of special study of standard costing.

3.2.4. Advantages and Limitations of Standard Costing

Advantages of standard costing

1. The weakness of the traditional costing system can be estimated by compiling standard costs more carefully.
2. Standard costs can be used as a yardstick against which actual costs can be compared. It is an effective tool for planning production costs. Hence, cost control is greatly facilitated.
3. Variance analysis helps management to have regular as well as better checks over costs incurred. It makes the application of the principle of management by exception more easy. That is, the management can concentrate its attention on variances only, leaving the other aspects of cost control to be taken care of at the lower level.
4. It is a valuable guide to management in the formulation of production and price policies in advance with certainty. It also assists management in the areas of profit – planning, product –pricing, and inventory pricing, etc.

5. Standard costing makes the reporting of operating data more meaningful and also fast. This makes the interpretation of management reports easy.
6. As the emphasis of the standard costing system is more on cost variations, it makes the entire organization cost conscious. It makes the employees recognize the importance of efficient operations so that costs can be reduced by joint efforts.
7. Labor, materials and machines can be effectively used, and economies can be affected in addition to increase productivity. Standards may also be used as the basis for introducing incentive schemes.

Limitations of standard costing

1. Setting of standards is a very difficult task. It requires a lot of scientific studies such as time – study, motion study, etc., and therefore it is very costly. Small firms may find it very difficult to operate such a system.
2. Standards are very rigid estimates and once set, are not changed for a considerable time. This makes the standards highly unrealistic in certain industries which face fluctuations in prices of products due to frequent changes.
3. The utility of variance analysis depends much more on the standard set. While a loosely set standard may be ridicule the standards which are set very high may create frustration in the minds of the workers. At the same time setting of correct standards is also, it is difficult to apply this system when production takes more than one accounting period.

3.2.5. DEVELOPMENT OF A STANDARD COST SYSTEM

Although standard cost systems were initiated by manufacturing companies, these systems can also be used by service and not-for-profit organizations. In a standard cost system, both standard and actual costs are recorded in the accounting records. This dual recording provides an essential element of cost control: having norms against which actual operations can be compared. Standard cost systems make use of ***standard costs,*** which are the budgeted costs to manufacture a single unit of product or perform a single service. Developing a standard cost involves judgment and practicality in identifying the material and labor types, quantities, and prices as well as understanding the kinds and behaviors of organizational overhead.

A primary objective in manufacturing a product is to minimize unit cost while achieving certain quality specifications. Almost all products can be manufactured with a variety of inputs that would generate the same basic output and output quality. The input choices that are made affect the standards that are set. Some possible input resource combinations are not necessarily practical or efficient.

Once management has established the desired output quality and determined the input resources needed to achieve that quality at a reasonable cost, quantity and price standards can be developed. Experts from cost accounting, industrial engineering, personnel, data processing, purchasing, and management are assembled to develop standards. To ensure credibility of the standards and to motivate people to operate as close to the standards as possible, involvement of managers and workers whose performance will be compared to the standards is vital.

Material Standards

The first step in developing material standards is to identify and list the specific direct materials used to manufacture the product. This list is often available on the product specification documents prepared by the engineering department prior to initial production. In the absence of such documentation, material specifications can be determined by observing the production area, querying of production personnel, inspecting material requisitions, and reviewing the cost accounts related to the product. Three things must be known about the material inputs: types of inputs, quantity of inputs used, and quality of inputs used.

In making quality decisions, managers should seek the advice of materials experts, engineers, cost accountants, marketing personnel, and suppliers. In most cases, as the material grade rises, so does cost; decisions about material inputs usually attempt to balance the relationships of cost, quality, and projected selling prices with company objectives. The resulting trade-offs affect material mix, material yield, finished product quality and quantity, overall product cost, and product salability. Thus, quantity and cost estimates become direct functions of quality decisions.

Given the quality selected for each component, physical quantity estimates of weight, size, volume, or some other measure can be made. These estimates can be based on results of engineering tests, opinions of managers and workers using the material, past material requisitions, and review of the cost accounts.

Specifications for materials, including quality and quantity, are compiled on a bill of materials. Even companies without formal standard cost systems develop bills of materials for products simply as guides for production activity. When converting quantities on the bill of materials into costs, allowances are often made for normal waste of components. After the standard quantities are developed, prices for each component must be determined. Prices should reflect desired quality, quantity discounts allowed, and freight and receiving costs. Although not always able to control prices, purchasing agents can influence prices. These individuals are aware of alternative suppliers and attempt to choose suppliers providing the most appropriate material in the most reasonable time at the most reasonable cost. The purchasing agent also is most likely to have expertise about the company's purchasing habits. Incorporating this information in price standards should allow a more thorough analysis by the purchasing agent at a later time as to the causes of any significant differences between actual and standard prices.

When all quantity and price information is available, component quantities are multiplied by unit prices to obtain the total cost of each component. (Remember, the price paid for the material becomes the cost of the material.) These totals are summed to determine the total standard material cost of one unit of product.

Labor Standards

Development of labor standards requires the same basic procedures as those used for material. Each production operation performed by either workers (such as bending, reaching, lifting, moving material, and packing) or machinery (such as drilling, cooking, and attaching parts) should be identified. In specifying operations and movements, activities such as cleanup, setup, and rework are considered. All unnecessary movements by workers and of material should be disregarded when time standards are set.

To develop usable standards, quantitative information for each production operation must be obtained. Time and motion studies may be performed by the company; alternatively, times developed from industrial engineering studies for various movements can be used. A third way to set a time standard is to use the average time needed to manufacture a product during the past year. Such information can be calculated from employees' past time sheets. A problem with this method is that historical data may include inefficiencies. To compensate, management and supervisory personnel normally make subjective adjustments to the available data.

After all labor tasks are analyzed, an **operations flow document** can be prepared that lists all operations necessary to make one unit of product (or perform a specific service). When products are manufactured individually, the operations flow document shows the time necessary to produce one unit. In a flow process that produces goods in batches; individual times cannot be specified accurately.

Labor rate standards should reflect the employee wages and the related employer costs for fringe benefits, FICA (Social Security), and unemployment taxes. In the simplest situation, all departmental personnel would be paid the same wage rate as, for example, when wages are job specific or tied to a labor contract. If employees performing the same or similar tasks are paid different wage rates, a weighted average rate (total wage cost per hour divided by the number of workers) must be computed and used as the standard. Differing rates could be caused by employment length or skill level.

Overhead Standards

To provide the most appropriate costing information, overhead should be assigned to separate cost pools based on the cost drivers, and allocations to products should be made using different activity drivers.

After the bill of materials, operations flow document, and predetermined overhead rates per activity measure have been developed, a standard cost card is prepared. This document summarizes the standard quantities and costs needed to complete one product or service unit.

Data from the standard cost card are then used to assign costs to inventory accounts. Both actual and standard costs are recorded in a standard cost system, although it is the standard (rather than actual) costs of production that are debited to Work in Process Inventory. Any difference between an actual and a standard cost is called a variance.

3.2.6. Considerations in Establishing Standards

When standards are established, appropriateness and attainability should be considered. Appropriateness, in relation to a standard, refers to the basis on which the standards are developed and how long they will be expected to last. Attainability refers to management's belief about the degree of difficulty or rigor that should be incurred in achieving the standard.

Appropriateness

Although standards are developed from past and current information, they should reflect relevant technical and environmental factors expected during the time in which the standards are to be applied. Consideration should be given to factors such as material quality, normal material ordering quantities, expected employee wage rates, degree of plant automation, facility layout, and mix of employee skills. Management should not think that, once standards are set, they will remain useful forever. Current operating performance is not comparable to out-of-date standards. Standards must evolve over the organization's life to reflect its changing methods and processes. Out-of-date standards produce variances that do not provide logical bases for planning, controlling, decision making, or evaluating performance.

Attainability

Standards provide a target level of performance and can be set at various levels of rigor. The level of rigor affects motivation, and one reason for using standards is to motivate employees. Standards can be classified as expected, practical, and ideal. Depending on the type of standard in effect, the acceptable ranges used to apply the management by exception principle will differ. This difference is especially notable on the unfavorable side.

Self test 3.1.

1. *Differentiate between standards and Budgets*
2. *Distinguish between standard input, standard price and standard cost.*

3.3. Classification of Budgets

3.3.1. Fixed or Static 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.

- ☞ ***Static budget is a budget that is based on one level of activity.***

Evaluating performance based upon the master budget which fixed and prepared at s ingle level of activity may not provide accurate picture of performance. This because usually the planned and actual output or activities levels may not be equal, as a result the comparison is performed at two different level of activity which hides the variance attribute to the actual performance units as well as overall organization. For example, if a company budgeted to produce and sell 12,000 units, but the actual performance showed only 10,000 units, the comparison of revenue, cost and profit at the budget and actual level of output do revels only the variance resulted from the difference in the level of output. Therefore unless the analysis is re done by adjusting the budgeted level of output towards the actual units produced and sold, the variance is not helpful to the management as performance evaluation tool.

- ☞ ***Static Budget Variance [SBV] is the difference between an actual result and the corresponding budgeted amount in a static budget.***

3.3.2. Flexible Budget

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 so as to avoid the inherent limitation of using static budget for performance evaluation. 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 12,000 units or any other production level.

3.4. Variance Analysis

The main advantage of the standard costing system is variance analysis. The principle of "management by exception" is practiced easily with the help of variances. Variance may be defined as the difference between standard and actual for each element of cost and sometimes for sales. And 'variance analyses'

may be defined as the process of analyzing variance by sub –dividing the total variance in such a way that management can assign responsibility for off –standard performance. When the actual results are better than expected, a 'favorable' variance arises; where they are not up to the standard, an 'adverse variance' occurs.

Variances help to fix the responsibilities so that management can ascertain the person responsible for the poor results. For example, an adverse material usage variance would indicate that excess material cost was due to inefficient use of materials. This would enable management to fix the responsibility on the supervisor in charge of a particular operation in which the inefficiency occurred. It may be discovered that the variance was caused by (say) inefficient handling, purchase of poor quality materials or employment of trainees. The important point is that the reason for the variance must be found, explained and wherever necessary, corrective measures taken.

Self test 3.2.

1. *Explain the differences between static budget and flexible budget*
2. *Define the term variance*

3.4.1. Flexible and static budget variances

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.

To have a better understanding of causes for variance managers usually require variance calculated at different level. Variance according to the degree of detailed feedback on performance can be classified as:

- Level 0 variance analysis
- Level 1 variance analysis
- Level 2 variance analysis
- Level 3 variance analysis
- Level 4 variance analysis

In this unit the focus is on level 0, 1, and 2 variances, and the reaming will be discussed in length on the next unit.

Now let see the preparation of flexible budget as well as analysis of variance using the following:

Illustration 3.1: **Kombolcha Garment Co**. manufactures and sells a jacket. Sales are made to distributors who sell to independent clothing stores Kombolcha Garment's only costs are manufacturing costs. All units manufactured in April 2003 are sold in April 2003. There is no beginning or ending inventory. Kombolcha Garment has variable cost categories. The budgeted data for April 2003 are:

Cost category	Variable cost / jacket.
DM costs……	Br. 60
DL costs…….	16
Variable MOH costs……	12
Total variable costs ……	**Br. 88**

The number of units manufactured is the cost driver for all variable-manufacturing costs. The relevant range for the cost driver is from 0 to 12,000 jackets. Budgeted manufacturing fixed costs are Br. 276,000 for production between 0 & 12,000 jackets. Budgeted selling price is Br.120/jacket. The static budget for April 2003 is based on selling 12,000 jackets.

The actual data for April 2003 are as follows:

Units sold ……	10,000 jackets
Revenues …….	Br. 1,250,000
Variable costs:	
DM ……..	621,600
DL……	198,000
Variable MOH……..	130,500
Fixed costs ……..	285,000

1. Level 0 or Static Budget Variance for operating income

Level zero variance analysis the least detail analysis which simply compares the operating income at static budget income statement with the operating income at the actual income statement. The level zero variance for Kombolcha Garment from the above given data is determined as,

Actual operating income……	Br. 14,900
Budgeted operating income……	108,000
SBV for operating income…….	**Br. 93,100 U**

The analysis revealed unfavorable variance as the actual operating income is lower than the budgeted operating income by Birr 93,100. The result here couldn't provide the management useful information as it couldn't show the contribution revenue and each cost element to operating income variance.

2. **Static Budget Variance (SBV)**

Level one variance can offer management a better insight about their organizational performance than level zero analysis. At this level, operating income variance will be decomposed into revenue and cost component as a result the management will identify the responsibility center that demands attention.

Static Budget Variance

Items	Actual Results (1)	Static Budget Variance(SBV) (2) = (1) – (3)	Static Budget Result (3)
Unit sales	10,000	2,000U	12,000 .
Revenues	Br.1,250,000	Br. 190,000U	1,440,000
Variable costs:			
DM	621,600	98,400F	720,000
DL	198,000	6,000U	192,000
MOH	130,500	13,500F	144,000
Total variable costs	950,100	105,900F	1,056,000
Contribution Margin	299,900	84,100U	384,000
Fixed Costs	285,000	9,000U	276,000
Operating Income	Br. 14,900	Br. 93,100U	Br. 108,000

Br. 93,100U SBV

The static budget variance shows an unfavorable variance for revenue, fixed costs whereas favorable variance of total variable cost. These variances are due primarily to the fact that the static budget was built on an output level of 12,000 units, while the company actually made and sold 10,000 units. The revenue variance might also be due to an average unit sales price that differed from budget. The variable cost variances might also be due to input prices that differed from budget (e.g., the price of fabric), or input quantities that differed from the per-unit budgeted amounts (e.g., yards of fabric per jackets) that may be identified at the later stages of the variance analysis.

Level 2-variance analysis [Flexible Budget Variance (FBV) & Sales-Volume Variance (SVV)]

To identify the amount of variance attributed the difference in the level of output as well as to real performance of the company, at this level the static budget variance will be decomposed into the flexible budget variance and sales volume variance.

Flexible Budget Variance (FBV) is a better measure of operating performance because they compare actual revenues to budgeted revenues and actual costs to budgeted costs for the same output level.

Sales-Volume Variance (SVV) is the difference between the flexible budget amounts and static budget amounts. It represents the variance caused solely by the difference in the actual output volume and budgeted quantity of output expected to be produced and sold in the static budget.

To determine the flexible budget variance and sales volume variance, first you need to develop a flexible budget. The flexible budget, for the example given above is prepared at the end of the period after the actual output level of 10,000 jackets is known. The flexible budget is that Kombolcha Garment would have prepared at the start of the budget period had it correctly forecasted the actual level of 10,000 jackets.

In preparing the flexible budget,

(1) The budgeted selling price is the same Br. 120/ jacket.
(2) The budgeted variable costs per unit are the same Br. 88/ jacket.
(3) The budgeted fixed costs are the same Br. 276, 000, are used.

The only difference between the static budget and the flexible budget is that the static budget is prepared for the planned output level of 12,000 jackets, whereas the flexible budget is based on the actual output of 10,000jackets.

The following stapes are used to prepare a flexible budget:

Step 1.Identify the Actual Quantity of Output produced and sold.

10,000jackets.

Step 2. Calculate the flexible budget for revenues based on Budgeted Selling Price and Actual Quantity of Output.

Flexible B for Revenues = Br. 120 /jacket X 10,000jacket

= Br. 1,200,000

Step 3. Calculate the Flexible Budget for Costs based on Budgeted Variable Costs per Unit, Actual Quantity of Output and Fixed Costs.

Flexible Budget for Variable Costs:

DM:	Br. 60/j X 10,000j	Br. 600,000
DL:	Br. 16/j X 10,000j	160,000
MOH:	Br. 12/j X 10,000j	120,000
FB for TVC		Br. 880,000
FB for FC		276,000
FB for Costs		**Br. 1,156,000**

Step 4: Building the flexible budget based on the information from steps 1 and 2, and step 3 results a flexible budget presented on column 3 of the following table.

After the flexible budget is developed it is possible to determine the flexible budget variance by comparing the flexible budget and the actual operational results, and sales volume variance by comparing the flexible budget results and the static budget as shown on the following table.

PARTICULARS	**AR (1)**	**FBV (2) = 1-3**	**FB(3)**	**SVV (4)**	**SB (5)**
Units sold	10000	0	10,000	2,000	12,000
Revenues	**1,250,000**	**50,000 F**	**1,200,000**	**240,000 U**	**1,440,000**
Direct material	621,600	21,6000 U	600,0000	120,000 F	720,000
Direct manfg. labor	198,000	38,000 U	160,0000	32,000 F	192,000
Variable manuf. Overhead	130,500	10,500 U	120,0000	24,000 F	144,000
Total Variable costs	**950,100**	**70,100 U**	**880,0000**	**176,000 F**	**1,056,000**
Contribution margin	299,900	20,100 U	320,000	64,000 U	384,000
Fixed costs	285,000	9,0000 U	276,0000	0	276,000
Operating income	**14,900**	**29,100 U**	**44,0000**	**64, 0000 U**	**108,000**

From this table, **Kombolcha Garment** sees that after adjusting for sales volume, revenue was higher than would have been expected. The favorable Birr 50,000 variance must be due entirely to an average sales price that was higher than planned which was Bir125 per jacket compared to the original budget of Birr120 per jacket.

Materials costs were higher than would have been expected for a sales volume of 2,000 units. This unfavorable variance is due to higher material prices, or to inefficient utilization of fabric (more waste than expected), or a combination of these two factors. Labor and overhead were higher than expected, even after adjusting for the sales volume of 2,000 units. This unfavorable flexible budget variance implies that either wage rates were higher than planned, or labor was not as efficient as planned, or both. Similarly, the components of variable overhead were either more expensive than budgeted, or were used more intensively than budgeted. For example, electric rates might have been higher than planned, or more electricity was used than planned per unit of output.

The fixed cost variances are identical in this table to the previous table. In other words, the flexible budget and flexible budget variance provide no additional information about fixed costs beyond what can be learned from the static budget variance.

3.4.1.1.Direct Material and Labor Variances

How are material, labor, and overhead variances calculated? How materials and labor cost variance computed when there are is only one type (classes) of material (labor) input used in the production? What about if there are more than one type (classes) of material (labor) input used in the production?

A. **Direct material cost variances:**

To completely and meaningfully analyze the flexible budget variance for material, it should be analyzed in terms of the materials price standard and the materials quantity standard. This level of analysis resulted

in: (i) material price variance that identifies the effect of differences in prices paid for materials. (ii)Material quantity (usage) variance that identifies the effect of difference in the quantities of materials used.

i) **Material Price Variance(MPV)**

A material price variance is the difference between the actual price of material/unit and the standard price of material per unit multiplied by the actual quantity of material purchased. In other words, the ***material price variance***(MPV) indicates whether the amount paid for material was below or above the standard price. Material price variance can be calculated as:

$$MPV = (SP - AP)\,AQ$$

where: SP is the standard price of material per unit
AP is actual price of material per unit
AQ is the actual quantity of material purchased and consumed

If the actual price is larger than the standard price, this variance is unfavorable (U); if the standards are larger than the actual; the variance is favorable (F)

ii) Materials Quantity (usage) Variance(MQV)

The ***material quantity variance***(MQV) indicates whether the actual quantity used was below or above the standard quantity allowed for the actual output. This difference is multiplied by the standard price per unit of material. i.e. A material quantity (usage) variance is the difference between the actual quantity of materials used and the standard quantity of materials that should have been used to produce the actual output, multiplied by the standard price of materials per unit. It can be calculated as:

$$\mathbf{MQV = (SQ-AQ) \times SP}$$

where: SP is the standard price of material per unit
SQ is the actual quantity of material used for units produced
AQ= the actual quantity of material used

If the actual quantity amounts are larger than the standard quantity amounts, this variance is unfavorable (U); if the standards are larger than the actual; the variance is favorable (F)

Example In August 2001, East Publishing Company's costs and quantities of paper consumed in manufacturing its 2002 Executive Planner and Calendar were as follow:

Actual unit purchase price	Br 0.16 per page
Standard quantity allowed for good production	195,800 pages
Actual quantity purchased during August	230,000 pages
Actual quantity used in August	200,000 pages
Standard unit price	Br 0.15 per page

Required:

a) Calculate the total cost of purchases for August.
b) Compute the material price variance on the bases of purchase
c) Calculate the material quantity variance.
d) Total FBV

Solution:

a) Total cost of purchases for August would be:

Actual unit purchase price (a) ---------- Br 0.16 per page
Actual quantity purchased during August (b) ---------- 230,000 pages
Total cost (a x b) ---------- Br.31, 220

b) MPV = (SP – AP) AQ
= (Br 0.15 per page - Br 0.16 per page) 230,000 pages= Br. 2,300 (U)

c) MQV = (SQ-AQ) x SP
= (195,800 pages - 200,000 pages) Br 0.15 per page= Br. 630(U)

d) Total FBV= Br 2,300U + Br. 630U= Br.2,930 U

B. Labor cost variances:

Just like we have done for material inputs, we will do the same meaningful analysis for labor inputs. Hence, the variance investigation to flexible budget variance for labor resulted in: (i) labor rate variance that identifies the effect of differences in the rates paid to workers, and (ii) labor efficiently or usage variance that identifies the effect of differences in the quantities of labor used.

i) Labor Rate Variance(LRV)

The ***labor rate variance***(LRV) shows the difference between the actual wages paid to labor for the period and the standard wages for all hours worked. Thus, Labor rate variance is the difference between the actual rate of labor per hour and the standard rate of labor per hour, multiplied by the actual hours of labor worked.

LRV= (SR-AR) x AH

Where: SR is standard rate of labor per hour

AR is actual rate of labor per hour, AH is a total actual hour of labor worked

ii) Labor Efficiency Variance (LEV)

A labor efficiency variance is the difference between the actual labor hours worked and the standard labor hours that should have been worked to produce the actual output, multiplied by the standard rate of labor per hour. Thus, multiplying the standard labor rate by the difference between the actual minutes worked and the standard minutes for the production achieved results in the ***labor efficiency variance***(LEV)

LEV = (SH – AH) x SR

Where: SH is standard hours of labor for the actual unit produced

AH is actual labor hours used for the unit produced

SR is standard rate of labor per hour

Example Sagittarius Corp. has established the following standards for the prime costs of one of its chief product, dart boards.

	Standard Qty	standard Price (Rate)	Total Standard cost
Direct material	8.5 pounds	Br.1.80/pound	Br.15.30
Direct labor	0.25 hour	8.00/hour	2.00
			Br.17.30

During May, Sagittarius purchased 160,000 pounds of direct material at a total cost of Br.304, 000. The total wages for May were Br.42, 000, 90% of which were for DL. Sagittarius manufactured 19,000 dart boards during May; using 142,500 pounds of direct material & 5,000 direct laborhours.

Required: Compute the following variances for May.

a) Direct material price variances
b) Direct materialusage variance
c) Direct material cost variance
d) Direct labor rate variance
e) Direct labor efficiency variance
f) Direct labor cost variance

Solution

Material Variances

i). SQ = Standard Quantity ofDirect material for Actual Output would be:

1 dart board = 8.5 poundsDirect material

19,000 dart boards =?

So, SQ = 8.5 pounds Direct material x 19,000 = 161,500 pounds

ii). SP = Standard price of Direct material = Br. 1.80/pounds.

iii). AP = Actual Price of Direct material = Total cost of Direct material purchased

Total units of direct material purchased

= Br. 304,000 = Br.1.90/ pounds

160,000 pounds

iv). AQ=Actual Quantity of Direct material purchased or used = 142,500 pounds

a) MPV= (SP – AP) AQ

= (Br.1.80/pds - Br.1.90/ pds) 142,500 pounds = Br. 14,250(U)

b) MQV = (SQ-AQ) x SP

= (161,500 pounds - 142,500 pounds) Br. 1.80/pounds= Br. 34,200(F)

c) Material cost variance = MPV + MQV

= Br. 14,250 (U) + Br. 34,200 (F) = Br. 19,950 (F)

Labor Variances

i) SR= Standard Rate of DL per hour= Br.8.00/Hr

ii) SH=Standard Hours of DL for Actual Output would be:

0.25Hrs=1dart board

? = 19,000 dart boards

SH = 0.25x19, 000=4,750Hrs

iii) AH=Actual hrs of DL used = 5,000 hrs

iv) AR= 0.9 x 42,000 = 37,800 = Br.7.56/Hr

5,000 5,000

d) LRV= (SR-AR) x AH

= (Br.8.00/Hr - Br.7.56/Hr) 5,000 hrs = Br. 2,200 (F)

e) LEV = (SH – AH) x SR

= (4,750Hrs - 5,000 hrs) Br.8.00/Hr = Br.2, 000(U)

f) labor cost variance = LRV + LEV= Br. 2,200 (F) + Br.2, 000(U) = Br. 200 (F)

3.4.1.2.Overhead Cost Variances

In developing overhead application rates, a company must specify an operating level or capacity. Capacity refers to the level of activity. Alternative activity measures include theoretical, practical, normal, and expected capacity. Because total variable overhead changes in direct relationship with changes in activity and fixed overhead per unit changes inversely with changes in activity, a specific activity level must be chosen to determine budgeted overhead costs.

A ***flexible budget*** is a planning document that presents expected overhead costs at different activity levels. In a flexible budget, all costs are treated as either variable or fixed; thus, mixed costs must be separated into their variable and fixed elements. The activity levels shown on a flexible budget usually cover the contemplated range of activity for the upcoming period. If all activity levels are within the relevant range,

costs at each successive level should equal the previous level plus a uniform monetary increment for each variable cost factor. The increment is equal to variable cost per unit of activity times the quantity of additional activity.

The use of separate variable and fixed overhead application rates and accounts allows separate price and usage variances to be computed for each type of overhead.

a. Variable overhead cost variance (VOHV)

This is the difference between standard variable overheads for actual production and the actual variable overheads.

Symbolically, VOHV =SC-AC Where: SC= standard variable overheads for actual production AC= actual variable overheads

It can be sub –divided into***Variable overhead expenditure variance, and Variable overhead efficiency variance.***

i) ***VOH expenditure variance*** is the difference between the standard variable overheads for the actual hours worked, and the actual variable overheads incurred. The formula for computing it is as follows:

VOH Exp. Variance = AVOH –SVOH. Where: AVOH is actual variable overheads incurred SVOH is standard variable overheads for the actual hours worked,

ii) ***VOH efficiency variance*** arises when the actual output produced differs from the standard output for actual hours worked. It is a measure of extra overhead (for saving) incurred solely because of the efficiency shown during the actual hours worked. The formula to compute it is as follows:

VOH efficiency variance = (SHOV for actual hours worked)- (SHOV for actual output)

Example From the following information, calculate VOH cost variances assuming labor hours as cost driver for variable manufacturing overhead.

Budget output	5000 units
Budgeted hours	10,000
Budgeted variable overheads	Br. 2,000
Actual variable overheads	Br. 3,000
Actual output	4,000 units
Actual hours	12,000 hours

Solution

i) VOH cost variance =AVOH –SVOH for actual production
= Br.3, 000 - (4000xBr 0.40*)
= Br...3,000- Br. 1600= Br.1400 (U)

ii) VOH expenditure variance = AVOH –SVOH for actual hours worked
= Br.3000 - (12000x0.20**) =Br. 600 (U)

iii) VOH efficiency variance =SVOH for actualHrs- SVOH for actual output
=Br. 2400 – Br. 1600=Br. 800 (U)

Workings:

*SVOH per unit of output –*Br*.2000/5000 = *Br*.0.40 per unit

** SVOH pre hours = *Br*.2000/10,000 = *Br*.0.20 per hour

b. Fixed overheads cost varinance (FOHV)

This is the difference between the standard fixed overheads for actual output and actual fixed overheads. The reasons for the variance are over absorption or under –absorption of overheads for the actual production the budgeted production may be different form the actual production for the actual overheads incurred. The major sub –divisions of FOHV are FOH expenditure variance and FOH volume variance. The formula for FOHV is as follows:

FOHV =AFOH –SFOH

Where: AFOH = actual fixed overheads.

SFOH = standard fixed overheads for actual output

Note that, if the AFOH is less than the SFOH, the variance is favorable (F), and vice versa. This variance can be classified into two.

i) FOH expenditure variance (FOHEV)

This is the difference between Actual fixed overhead costs and Budgeted fixed overhead

(Symbolically, FOHEV= AFOH –BFOH)

If the actual is greater than the budgeted, this variance is adverse (U), and vice versa

ii) FOH volume Variance (FOHVV)

This is the difference between the budgeted fixed overheads and the standard fixed overheads absorbed on actual production. The formula is as follows:

FOHVV =BFOH –SFOH on actual production.

If the BFOH is greater than the SFOH on actual production, the variance is adverse (U) and vice versa.

Example : From the following data calculate FOH cost variance.

Budgeted hours: 10,000 hours; Budgeted output: 5,000 units, Budgeted FOH: Br.3,000Actual hours: 12,000hours; Actual output:4,800 units; Actual FOH: Br.3,600

Solution:

a. FOHV =AFOH –SFOH on actual output

= Br.3600-(0.60* x4800)

= Br. 3600-Br. 2880=.Br.720 (U)

b. FOHEV=AHOH –BFOH

= Br.3600 – Br.3000=.Br.600 (U)

c. FOHVV =BFOH –SFOH on actual output

= Br.3000-(0.60x4800)

= Br.3000 – 2880 =.Br.120 (U)

Workings:

*SFOH per unit = Br. 3000/5000= Br.0.60 per unit

3.5. Summary

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

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

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

Answer for Self test Questions

Self test 3.1.

1. **Standards :** are predetermined input, price , or cost allowed or required per unit of a product. Whereas, **budgets** are predetermined input, cost, or price expressed in total basis.
2. **Standard input:** is the quantity of inputs required to produce each unit of a product.

   Standard price: is the cost per a unit of input.

   Standard Cost: is the cost per each unit of finished product.

Self test 3.2.

1. Static budget is a budget prepared at the start of the budget period based on the budgeted unit sales , price and budgeted costs whereas flexible budget is prepared at the end of the period on the basis of budgeted price, costs but actual quantities of output units sold. Thus, the only difference between static and flexible budget is the former is prepared using the quantities of output units estimated to be sold and the later is prepared using the actual quantities of output units sold.
2. Variance is the difference between actual results and predetermined (budgeted) results.

3.6. Review Questions

PART I- True or False

Instruction, dear learners, please write true if the statement is correct and write false if the statement is wrong

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- Fill in the Blank Spaces

Instruction, Dear Learners, please fill in the blank spaces with appropriate words or phrases

1. _____ is based on the level of output planned at the start of the budget period.
2. _____ Variances which arise from change in input prices from the expected Prices (budgeted prices.)
3. _____ Variances which arise from use of unit quantities.
4. The price and efficiency variances together are sometimes referred as _____
5. The flexible-budget variance pertaining to revenues is often called _____
6. 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
7. _____ 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.
8. The _____ measures the difference between the actual variable overhead costs and the flexible-budget variable overhead costs.
9. 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
10. The _____ is the difference between actual fixed overhead costs and the fixed overhead costs in the flexible-budget:

PART III- Problems

Instruction, Dear Learners, please work out the following questions by showing the necessary steps

Q1. Heaven Company manufactures ceramic vases. It uses its standard costing system when developing its flexible budget amounts. In April 2008, 2,000 finished units were produced. The following information is related to its two direct manufacturing cost categories of direct materials and

direct manufacturing labor.

Direct materials used were 4,400 pounds. The standard direct materials input allowed for one output unit are 2 pounds at $ 15 per pound. 6,000 pounds of materials were purchased at $ 16.5 per pound, a total of $99,000.

Actual direct manufacturing labor hours were 3250 at a total cost of $66,300. Standard manufacturing labor time allowed is 1.5 hours per output unit, and the standard direct manufacturing labor cost is $ 20 per hour.

Required:

2. Calculate the direct materials price and efficiency variances and the direct manufacturing labor price and efficiency variances.

2. Prepare journal entries for a standard costing system that isolates variances as early as possible l

Answer for Review Questions

Part I- Solutions

1.False
2. True
3.True
4.False
5. True
6. True
7. True
8. True

Part II- Solutions

1. A static budget
2. Price variance
3. Efficiency variance
4. flexible budget variances
5. selling-price variance
6. production-volume variance
7. Efficiency variance
8. variable overhead flexible-budget variance
9. variable overhead spending variance
10. fixed overhead flexible-budget variance

PART III- PROBLEMS

1.

LEVEL 3 ANALYSES

	Actual Incurred: (Actual Input × Actual Price) (1)	**Actual input × Budgeted Price (2)**	**Flexible Budget: (Budgeted Input Allowed for Actual Output × Budgeted Price) (3)**
Direct Materials	(6000 × $16.5) $99,000	(6000 × $15) $90,000 / (4,400 x$15,000) $ 66,000	(4,000 × $15) $60,000
		$9,000 U Price variance	$6,000 U Efficiency variance
Direct Labor	(3250 × $20.4) $66,300	(3250 X $ 20,000) $ 65,000	(3,000 X $ 20,000) $60,000
		$1,300 U Price variance	$5,000 U Efficiency variance

CHAPTER FOUR: MEASURING MIX AND YIELD VARIANCES

After studying this chapter, you should be able to:

- ✍ Distinguish between variance analysis procedures where inputs can not be substituted for one another and those where inputs can be so substituted
- ✍ Understand how direct materials yield and mix variances highlight trade offs among material inputs
- ✍ Explain direct manufacturing labor yield and mix variances
- ✍ Describe the insight gained from dividing the sales volume variance in to the sales mix and sales quantity variances
- ✍ Explain how market size and market share variances provide different explanations for a sales quantity variance

4.1. Introduction

Dear Learners! Comparing actual results with budgets can help managers evaluate operations and focus on areas that deserve more attention. Chapter 3 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 **Chapter 3** 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.

4.3. Mix and Yield Variances

☞ ***Dear learner! What do you know about production mix and yield?***

Most companies use a combination of many materials and various classifications of direct labor to produce goods. In such settings, the material and labor variance analysis presented in the above section are insufficient.

When a company's product uses more than one material, the goal is to combine those materials in such a way as to produce the desired product quality in the most cost-beneficial manner. Sometimes, materials can be substituted for one another without affecting product quality. In other instances, only one specific material or type of material can be used. For example, a furniture manufacturer might use either oak or maple to build a couch frame and still have the same basic quality. A perfume manufacturer, however, may be able to use only a specific fragrance oil to achieve a desired scent.

Labor, like materials, can be combined in many different ways to make the same product. Some combinations will be less expensive than others; some will be more efficient than others. Again, all potential combinations may not be viable.

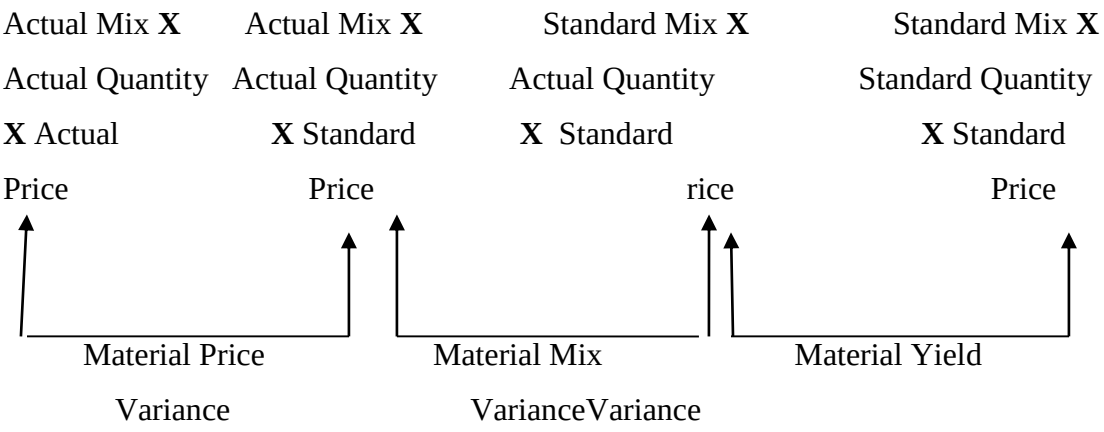
Management desires to achieve the most efficient use of labor inputs. As with materials, some amount of interchangeability among labor categories is assumed. Skilled labor is more likely to be substituted for

unskilled because interchanging unskilled labor for skilled labor is often not feasible. However, it may not be cost effective to use highly skilled, highly paid workers to do tasks that require little or no training. A rate variance for direct labor is calculated in addition to the mix and yield variances.

Each possible combination of materials or labor is called a ***mix*.** Management's standards development team sets standards for materials and labor mix based on experience, judgment, and experimentation. Mix standards are used to calculate mix and yield variances for materials and labor. An underlying assumption in product mix situations is that the potential for substitution exists among the material and labor components. If this assumption is invalid, changing the mix cannot improve the yield and may even prove wasteful. In addition to mix and yield variances, price and rate variances are still computed for materials and labor.

4.3.1. Material Mix and Yield Variances

A material price variance shows the Birr effect of paying prices that differ from the raw material standard. The ***material mix variance*** **(MMV)** measures the effect of substituting a nonstandard mix of materials during the production process. The ***material yield variance*** **(MYV)**is the difference between the actual total quantity of input and the standard total quantity allowed based on output; this difference reflects standard mix and standard prices. The sum of the material mix and yield variances equals a material quantity variance; the difference between these two variances is that the sum of the mix and yield variances is attributable to multiple ingredients rather than to a single one. A company can have a mix variance without experiencing a yield variance. Computations for the price, mix, and yield variances are given below in a format similar to that used in the above section.



The formula to compute material mix and yield variance would be:

To compute material mix variance:

Material Mix Variance(MMV)= (RSQ – AQ)SP

Where, RSQ = revised standard quantity(i.e. actual quantity at standard mix)

= SQ for each material x Total AQ (OR)

Total SQ

= Total AQ X standard mix ratio

AQ= Actual Quantity at actual mix SP = standard price

To compute material yield variance:

MYV = (SQ – RSQ)SP

Where, SQ= Standard Quantity at standard mix

RSQ = Revised Standard Quantity SP = standard price

Example The Scent Makers Company produces perfume. To make this perfume, Scent makers uses three different types of fluids: Dycone, Cycone, &Bycone are used in standard proportions of 4/10, 3/10, & 3/10 and their standard costs are Br. 6.00, Br. 3.50 & Br. 2.50 per unit, respectively. The chief engineer reported that for 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 material, as inventory storage space is costly.

Last week the company produced 75,000 pints of perfume at a total direct material cost of Br. 449,500. The actual number of pints used and costs per unit for the three fluids are as follows:

Material	Actual Pints	Cost/Pint
Dycone	45,000	Br. 5.50
Cycone	35,000	4.20
Bycone	20,000	2.75
	100,000	

Required

1) Compute the total direct material yield & mix variances for the last week..
2) Compute the total direct material price & usage variances for perfume made in the last week.

Solution:

i) SQ = Standard quantity for actual output

Standard yield (80% on 100 pints of mix)

i.e. 80pints required = 100 pints of mix

For actual production of 75,000 pints =?

=75,000 x 100 = 93,750 pints of mix

80

So, SQ for: Dycone: 0.4 x 93,750 = 37,500

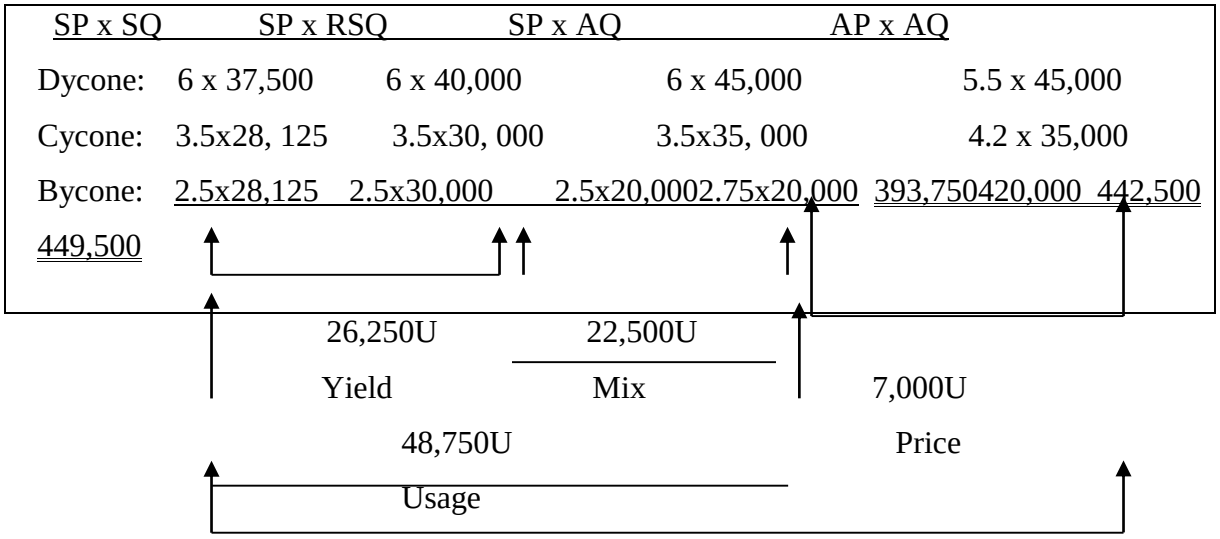
Cycone: 0.3x93, 750=28,125

Bycone: 0.3x93, 750= 28,125

4.4.RSQ for:

Standard Mix		Actual quantity	Proportion	RSQ
Dycone :	0.4	45,000	0.4 x 100,000	40,000
Cycone :	0.3	35,000	0.3 x 100,000	30,000
Bycone :	0.3	20,000	0.3 x 100,000	30,000
			Total	100,000

Thus, the direct material cost variances, in diagram, would be:



55,750U

FBV for direct material

Note:

a) MYV = 1-2= SP x (SQ x RSQ) = Br. 26,250U
b) MMV =2-3= SP x (RSQ-AQ) = Br.22,500U
c) MQV=1-3 = (SP x SQ) – (AP x AQ) =MYV+ MMV=Br. 48,750U
d) MPV=3-4= (SP-AP)AQ= Br. 7,000 U
e) FBV for DM= 1-4= (SP x SQ) –(AP x AQ)= MQV+ MPV=Br. 55,750 U

4.3.2. Labor Mix and Yield Variances

The labor rate variance is a measure of the cost of paying workers at other than standard rates. The labor mix variance is the financial effect associated withchanging the proportionate amount of higher or lower paid workers in production.The labor yield variance reflects the monetary impact of using more orfewer total hours than the standard allowed. The sum of the labor mix and yieldvariances equals the labor efficiency variance. The diagram for computing laborrate, mix, and yield variances is as follows:

(Actual Mix)**X** (Actual Mix)**X** (Standard Mix)**X** (Standard Mix)**X**

(Actual Hours)(Actual Hours)(Actual Hours)(Standard Hours)**X** (Actual Rate)**X** (StandardRate)**X**(Standard Rate)**X** (Standard Rate)

The formula to compute labor mix and yield variance would be:

To compute labor mix variance:

Labor Mix Variance (LMV)= (RSH –AH)SR

Where: RSH= revised standard hour (i.e. actual hours at standard mix)

= SH for each labor x Total AH (OR)

Total SH

= Total AH X standard mix ratio

AH=Actual hours at actual mix SR= standard rate per hours

To compute Labor Yield Variance

Labor Yield Variance(LYV) = (SH-RSH)SR

Where: SH= standard hours at standard mix

RSH= revised standard hour SR= standard rate per hours

Example Buffon Legal Services has three labor classes: secretaries, paralegals, and attorneys. The standard wage rates are shown in the standard cost system as follows: secretaries, Br 25 per hour; paralegals, Br 40 per hour; and attorneys, Br 85 per hour. The firm has established a standard of 0.5 hours of secretarial time and 2 hours of paralegal time for each hour of attorney time in probate cases. The actual direct labor hours worked on probate cases and the standard hours allowed for the work accomplished for one month in 2001 were as follows:

	Standard Hours for Output Achieved	Actual Labor Hrs
Secretarial	500	500
Paralegal	1,800	2,000
Attorney	1,100	1,000
Total:	3, 400hrs	3,500hrs

Required: Calculate the amount of the direct labor efficiency variance for the month and decompose the total into the following components:

1. Direct labor mix variance

2. Direct labor yield variance

Solution:

i) SR= Standard Rate per DL Hr

For Secretarial: Br. 25,Paralegal: Br 40, and for Attorney: Br 85

ii) RSH: Revised Standard hours = SH for each labor x Total AH

Total SH

RSH for Secretarial: 500 hrs x 3, 400hrs = 486hrs

3,500hrs

For Paralegal: 2,000 hrs x 3, 400hrs = 1,943hrs

3,500hrs

For Attorney: 1,000 hrs x 3, 400hrs = 971hrs

3,500hrs

a) LMV= (RSH – AH)SR

For Secretarial: (486hrs - 500 hrs) Br. 25 = Br. 350 (U)

For Paralegal: (1,943hrs - 1, 800 hrs) Br 40 = 5,720(F)

For Attorney: (971hrs - 1, 100 hrs) Br 85 = 10,965(U)

Total Br.5, 595(U)

b) LYV = (SH-RSH)SR

For Secretarial: (500 hrs - 486hrs) Br. 25 = Br. 350 (F)

For Paralegal: (2,000 hrs- 1,943hrs) Br 40 = 2,280(F)

For Attorney: (1,000 hrs - 971hrs) Br 85 = 2,465(F)

Total Br.5, 095(F)

4.4. Sales Variances

The standard costing system is complete only when sales variances are detailed with it as part of comprehensive information presented to management. Sales variances are calculated by two methods, viz., ***sales value method and sales margin or profit method.*** Basically, changes in price and changes in sales volume give rise to sales variances. A change in value may, in its own turn, result due to a change in quantity, or a change in sales mix

4.4.1. SALES VALUE METHOD

The value method is used to denote variance arising due to change in sales price, quantity mix, etc, or the sales value. The sales variances may be classified as: Sales price variance, and Sales volume variance.

a) **Sales Value Variance (SVV)** is the difference between standard sales and the actual sales.

i.e. SVV =(SS-AS)=(SP X SQ) –(AP X AQ) Where: SP= standard price AP = actual price SQ= standard quantity to be sold AQ= actual quantity sold

b) **Sales Price Variance (SPV)** is the difference between standard price of actual quantity and actual price of the actual quantity of goods sold

i.e. SPV = AQ (SP –AP) Where: SP= standard price AP = actual price AQ= actual quantity sold

If the actual price is greater than the standard price, the variance is favorable, and vice versa.

c) **Sales Volume Variance (SVLV**) is the difference between the actual quantity or volume and the standard quantity or volume and the standard quantity or volume of sales. It shows the effect of a change in volume of total sales.

SVLV =SP(SQ -AQ) Where: SQ= standard quantity to be sold AQ= actual quantity sold SP= standard price

If the actual quantity sold is greater than the standard, the variance is favorable, and vice versa.

Sales volume variance may be further divided into sales mix variance and sales quantity or sub –volume variance

d) Sales Mix Variance (SMV)

Where two or more items are used in the composition of sales, the differences between the standard compositions of sales and the actual composition or mix is called the sales mix variance. It is a part of the value variance arising due to change in the mix. It highlights the fact that the actual mix of sales has not been in the same ratio as budgeted

SMV= SP (Revised standard sales – Actual sales) where: SP= standard price

Note that the ***revised standard sales*** are calculated by ***dividing the total actual sales quantity in the standard proportion***. If the actual sales quantity is greater than the revised standard quantity, the variance is favorable, and vice versa.

e) Sales Quantity Variance (SQV)

This is the difference between the revised standard quantity of actual sales and the standard quantity budgeted. This variance shows the position of actual quantity of sales, as distinct from the mix of sales, in comparison with budgeted or expected sales.

Thus, SQV =SP (SQ -RSQ)
Where: SP= standard price SQ= standard quantity to be sold
RSQ = revised standard sales (quantity***)***

If the RSQ is greater than the SQ, the variance is favorable, and vice versa.

Example: calculate (i) sales variance (ii) sales price variance; (iii) sales volume variances, (iv) sales mix variance and (v) sales quantity variance from the following

	Standard		Actual	
Product	quantity (units)	price (Br.)	quantity (units)	price (Br.)
A	5,000	5.00	5,000	5.00
B	4,000	6.00	6,000	6.25
C	3,000	7.00	4,000	6.75
Total	12,000		15,000	

Solution

- Sales value variance = (SP X SQ) – (AP X AQ)

Product A= (5,000 x Br. 5) – (5,000 x Br. 5) = Br 0
Product B= (4,000 x Br. 6) – (6,000 x Br. 6.25) = 13,500 F
Product C= (3,000 x Br. 7) – (4,000 x Br. 6.75) = 6,000 F
Total =Br 19,500 F

- Sales price variance =AQ (SP- AP)

Product A= 5,000 (Br. 5- Br. 5) = Br 0
Product B= 6,000 (Br. 6- Br. 6.25) = 1,500 F
Product C= 4,000 (Br. 7- Br. 6.75) =1,000 U
Total =Br 500 F

- Sales Volume Variance =SP(SQ- AQ)

Product A = Br. 5(5,000 - 5,000) =Br 0
Product B = Br. 6(4,000 - 6,000) = 12,000 F
Product C = Br. 7(3,000 - 4,000) = 7, 000 F
Total = Br 19,000 F

- Sales mix variance =SP(RSQ* - AQ)

Product A= Br. 5(6,250 - 5,000) =Br 6,250 U
Product B = Br. 6(5,000 – 6000) =6,000 F
Product C = Br. 7(3,750 – 4,000) =1,750 F
Total = Br.1, 500 F

*Calculation of RSQ: total AQ x standard ratio = 15,000units x (5:4:3)

Product A= 15,000x5/12	=6,250 units
Product B =15,000x4/12	=5,000 units
Product C =15,000x3/12	=3,750 units
Total	=15,000 units

- Sales quantity variance =SP(SQ- RSQ)

Product A= 5(5,000- 6,250)	= Br6,250 (F)
Product B= 6(4,000- 5,000)	=6,000 (F)
Product C= 7(3,000- 3,750)	=5,250 (F)
Total	= Br 17, 500 (F)

4.4.2. Sales Margin Method or Profit Method

Sales margin variance this is the difference between the standard margins appropriate to the quantity of sales budgeted for a period, and the margin between standard cost and the actual selling price of the sales effected. This variance arises due to the difference between total budgeted profit and total actual profit

Sales Margin Variance = budgeted profit – actual profit

Sales margin variance may be classified into the sales margin price variance and sales margin volume

i) ***Sales margin price variance*** which is due to the difference between the standard price of the quantity of sales affected, and the actual price of the sales. It is the difference between the standard profit and actual profit. This variance is similar to the price variance calculated under value method, and the formula is as follows:

Margin price variance = AQ (Standard profit –Actual Profit)

If the actual profit is greater than the standard profit, the variance is favorable and vice versa.

ii) ***Sales margin volume variance***. This is the portion of total margin variance which is due to the difference between the budgeted quantity and actual quantity of sales. This is the amount by which standard profit differs from budgeted profit. The formula is as follows:

Margin volume variance = standard profit (SQ -AQ)

If the actual quantity is greater than standard quantity, the variance is favorable, and vice versa.

iii) ***Sales margin mix variance.*** This is that portion of total margin variance which is due to the difference between the budgeted and actual quantities of each product of which the sales mixture is composed, valuing sales at the standard net selling prices and cost of sales at standard. That is, the difference between the revised standard profits is the mix variance.

Margin mix variance =standard profit (RSQ –AQ)

If the actual quantity is greater than the revised standard quantity, the variance is favorable, and vise versa

Example. ABC Ltd had budget the following sales for December 2007.

Product A 9,000 units at Br.5per unit

Product B 6,500 units at Br.10per unit

Product C 12,000 units at Br7.5per unit

As against this, the actual sales were:

Product A 10,000 units at Br.5per unit

Product B 7,000 units at Br.10per unit

Product C 11,000 units at Br 7.5per unit

The cost per unit of A, B and C was Br.4.5, Br.8.5, and Br.6.5 respectively. Compute the different variances to explain the difference between budgeted profit and actual profit.

Solution

i) Sales margin variance =(SM x SQ) – (AM x AQ)

Product A = (0.5 x9,000)-(1x10,000) = Br. 5,500 (F)

Product B = (1.5 x6,500)-(1x70,00) = Br. 2,750 (U)

Product C = (1x12,000)-(1.3x11,000)= Br. 2300 (F)

Total Br.5,050 (F)

ii) Sales margin price variance = AQ(SM –AM)

Product A = 10,000 (Br. 0.5 _ Br. 1.00) =Br. 5,000 (F)

Product B =7,000 (Br. 1.5 _ Br. 1.0) =. Br. 3,500(U)

Product C = 11,000 (Br. 1.0_ Br. 1.3) =Br. 3,300 (F)

Total Br.4800 (F)

iii) Sales margin volume variance = SM (SQ –AQ)

Product A = Br. 0.5 (9,000- 10,000) = Br. 500 (F)

Product B = Br. 1.5 (6,500-7,000) = Br. 750 (F)

Product C = Br. 1.0(12,000-11,000) = Br. 1,000 (U)

Total Br. 250 (F)

iv) Sales margin mix variance =SM (RSQ –AQ)

Product A = Br. 0.5 (9,164– 10,000) =. Br. 418(F)

Product B = Br. 1.5 (6,618–7,000) =Br. 573 (F)

Product C = Br. 1.0(12,218–11,000) =Br. 1218(U)

Total Br.227 (U)

v) Sales margin quantity variance = SM (SQ-RSQ)

Product A = Br. 0.5(9,000 – 9,164) =Br 82 (F)

Product B = Br. 1.5(6,500 – 6,618) = Br 177 (F)

Product C = Br. 1.0(12,000 – 12,218) = Br 218(F)

TOTAL = Br. 477 (F)

*Working notes on profit per unit for budget and actual, and RSQ

BUDGET

Product	SQ	SP	Total sales	Cost per unit	Total cost	profit per unit	Total profit
	Br		Br Br	Br	Br BrBr		
A	9,000	5	45,000	4.5	40,500	0.5	4,500
B	6,500	10	65,000	8.5	55,250	1.5	9,750
C	12,000	7.5	90,000	6.5	78,000	1.0	12,000
	27,500		200,000		173,750		26,250

ACTUAL

A	10,000	5.5	55,000	4.5	45,000	1.0	10,000
B	7,000	9.5	66,500	8.5	59,500	1.0	7,000
C	11,000	7.8	85,800	6.5	71,500	1.3	14,300
	28,000		207,300		176,000		31,300

RSQ = AQ x (Standard ratio) = 28,000 x (18:13:24)

Product A= 28,000 x 18/55 9,164

Product B = 28,000 x 13/55 6,618

Product C = 28,000 x 24/55 12,218

4.5. Causes and Disposition of Variances

In order to make the variance analysis a control instrument, the management should investigate the causes of variances and take the necessary corrective measures. There is no uniformity of opinion regarding the disposal of variances. ***Method I:*** where it is desired to maintain the same standard in future, the variances must be written –off to Profit and Loss Account. ***Method II:*** According to strict principle, the amount of variances resulting from incorrect standards or condition beyond control, like material price changes, wage rate increases due to fair legislation, etc., are allocated to inventories and cost of sales in proportion to their value of closing balances. ***Method III:*** another method is to carry forward the variances to the next financial year by crediting the same to a reserve account to be set off in the subsequent year or years. The favorable and adverse variances may cancel each other in the course of reasonable time and thus be disposed of.

1. ***Materials price variances***. (a) *Causes.* Change in market price, delivery costs, purchase of non – standard materials, emergency purchases, incorrect shipping instruction, loss of discounts, etc.(b) *Disposition.* If all or a portion of the price variance is the result of inefficiencies or a saving has resulted from efficient purchasing, the amount may be adjusted to Profit and Loss Account. If it is due to incorrect

standards or change in market price, the amount may be adjusted to inventories and cost of goods sold. It may be mentioned that under method I, such adjustment must be made for inventories under materials control, work –in –progress, finished goods, and cost of the goods sold. Under Methods II and III, such adjustments are required for inventories under work –in –progress, finished goods, and cost of goods sold.

2. ***Materials usage variance*** (a) *Causes*. Poor quantity of materials: change in material mix, product or production methods: careless handing: excessive waste or scrap; incorrect setting of standards.(b) *Disposition*. The amount of usage variance resulting in inefficiency in handling and processing materials is transferred to profit and loss account. The amount of usage variance due to incorrect standards is apportioned to work –in –progress, finished goods and cost of goods sold.

3. ***Direct wages rate variances***: (a) *Causes* general rise due to ward or agreement, non –standard grade, abnormal overtime or payment above or below standard rates during seasonal or emergency operations. (b) *Disposition*. The amount of variance arising out of inefficiency can be controlled if transferred to profit and loss account. The amount of variance resulting from the use of out –of –date standards or from conditions beyond the control of management is adjusted to work –in –progress, finished goods and cost of goods sold, on the basis of wages or time.

4. ***Direct labor efficiency variance*** (a) *Causes*, Poor working conditions, abnormal idle time, i.e. power failure, breakdown, go slow technique quality of supervision, non standard grade of material, or employee non cooperation in service departments. (b) *Disposition.* The amount of variance attributed to various forms of inefficiency which are controllable is transferred to profit and loss account. The amount of variance resulting from improperly prepared standard and from conditions beyond the control of management may be adjusted to work – in – progress, finished goods, and cost of goods sold.

5. ***Overhead expenditure variance*** (a) *Causes*. Under the over utilization of a service; seasonal conditions; inefficiency in the use of a service (e.g., electricity in lieu of gas)(b) *Disposition.* The amount of variance due to seasonal conditions should be treated as a deferred item. The amount arising out of inefficiency which is controllable is transferred to profit and loss account. The amount resulting from incorrectly prepared standard and from conditions beyond control is adjusted to work in progress, finished goods, and cost of goods sold.

4.6. Summary

A standard cost is computed as a standard price multiplied by a standard quantity. In a true standard cost system, standards are derived for prices and quantities of each product component and for each product. A standard cost provides information about a product’s standards for components, processes, quantities, and costs.

A variance is any difference between an actual and a standard cost. A total variance is composed of a price and a usage sub variance. The material variances are the price and the quantity variances. The material price variance can be computed on either the quantity of material purchased or the quantity of material used in production. This variance is computed as the quantity measure multiplied by the difference between the actual and standard prices. The material quantity variance is the difference between the standard price of the actual quantity of material used and the standard price of the standard quantity of material allowed for the actual output.

The two labor variances are the rate and efficiency variances. The labor rate variance indicates the difference between the actual rate paid and the standard rate allowed for the actual hours worked during the period. The labor efficiency variance compares the number of hours actually worked against the standard number of hours allowed for the level of production achieved and multiplies this difference by the standard wage rate.

If separate variable and fixed overhead accounts are kept (or if this information can be generated from the records), two variances can be computed for both the variable and fixed overhead cost categories. The variances for variable overhead are the VOH spending and VOH efficiency variances. The VOH spending variance is the difference between actual variable overhead cost and budgeted variable overhead based on the actual level of input. The VOH efficiency variance is the difference between budgeted variable overhead at the actual activity level and variable overhead applied on the basis of standard input quantity allowed for the production achieved.

The fixed overhead variances are the FOH spending and volume variances. The fixed overhead spending variance is equal to actual fixed overhead minus budgeted fixed overhead. The volume variance compares budgeted fixed overhead to applied fixed overhead. Fixed overhead is applied based on a predetermined rate using a selected measure of capacity. Any output capacity utilization actually achieved (measured in standard input quantity allowed), other than the level selected to determine the standard rate, will cause a volume variance to occur.

Actual costs are required for external reporting, although standard costs may be used if they approximate actual costs. Adjusting entries are necessary at the end of the period to close the variance accounts. Standards provide a degree of clerical efficiency and assist management in its planning, controlling, decision making, and performance evaluation functions. Standards can also be used to motivate employees if the standards are seen as a goal of expected performance.

A standard cost system should allow management to identify significant variances as close to the time of occurrence as feasible and, if possible, to help determine the variance cause. Significant variances should be investigated to decide whether corrective action is possible and practical. Guidelines for investigation should be developed using the management by exception principle.

4.7. Review Questions

Part I: WORK OUT QUESTIONS

1. Poly Containers makes 300-gallon plastic water tanks for a variety of commercial uses. The standard per unit material, labor, and overhead costs are as follows:

Direct material: 80 pounds @ Br.2	Br.160
Direct labor: 1.25 hours @ Br.16 per hour	20
Variable overhead: 30 minutes of machine time @ Br.50.00 per hour	25
Fixed overhead: 30 minutes of machine time @ Br.40.00 per hour	20

The overhead application rates were developed using a practical capacity of 6,000 units per year. Production is assumed to occur evenly throughout the year.

During May 2001, the company produced 525 tanks. Actual data for May 2001 are as follows:

Direct material purchased: 46,000 pounds @ Br.1.92 per pound

Direct material used: 43,050 pounds (all from May's purchases)

Total labor cost: Br.10, 988.25 for 682.5 hours

Variable overhead incurred: Br.13, 770 for 270 hours of machine time

Fixed overhead incurred: Br.10, 600 for 270 hours of machine time

Required: Calculate the following:

a. Material price variance based on purchases

b. Material quantity variance

c. Labor rate variance

d. Labor efficiency variance

e. Variable overhead spending and efficiency variances

f. Fixed overhead spending and volume variances

2. Rock Solid Engineering Company compares actual results with a flexible budget. The standard DL rates used in the flexible budget are established each year at the time the annual plan is formulated and held constant for the entire year. The standard hours allowed for the actual output of insurance claims for April in a claims department are shown in the following schedule:

Labor ClassesStandard Rate/HrsStandard hrs for Actual output

Class III	Br. 8.00	500 Hrs
Class II	7.00	500
Class I	5.00	500

Required: compute

1) DL rate & efficiency Variances
2) DL mix & Yield Variances

ANSWER TO MODEL EXAMINATION QUESTIONS

A. SOLUTIONS FOR WORKOUT QUESIONS

Q1.

a) MPV= (AP x AQ) - (SP x AQ)
= (Bir1.92 x 46,000) - (Bir2.00 x 46,000) =Bir3,680 F

b) MQV= (SP x AQ)- (SP x SQ)
= (Bir2 x 43,050) – (Bir2 x 42,000*) = Bir2,100 U
**SQ = 525 x 80 pounds = 42,000 pounds*

c) LRV= (AR* x AH) –(SR x AH)
= (Bir16.10 x 682.5) - (Bir16 x 682.5) = Bir68.25 U
***AR= Bir10, 988.25 / 682.5 hours = Bir16.10 per hour*

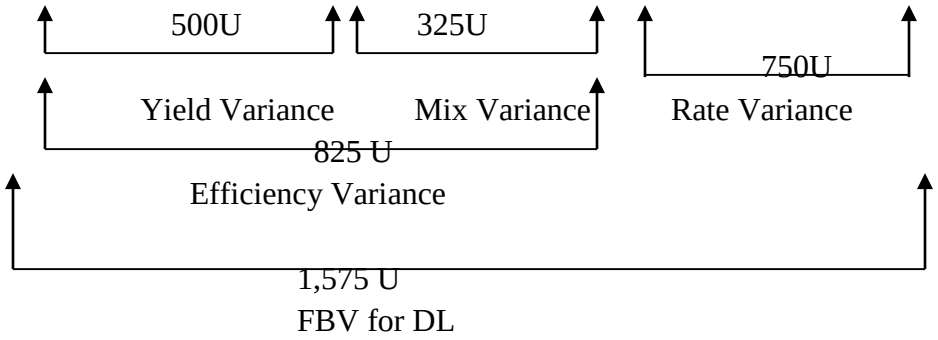
d) LEV = (SR x AH) – (SR x SH*)
= (Bir16 x 682.5) - (Bir16 x 656.25) =Bir420 U
**SH= 525 x 1.25 hours = 656.25 hours*

e) VOH Spending Variance= Actual VOH – (SP x AQ)
= Bir13,770 – (Bir50.00 x 270) = Bir270 U
VOH Efficiency Variance= (SP x AQ) – (SP x SQ*)
= (Bir50.00 x 270) – (Bir50.00 x 262.5) =Bir375 U
* SQ= 525 x 0.5 = 262.5 hours

f) FOH Spending Variance = Actual FOH - Budgeted FOH**
= Bir10,600 - Bir10,000 =Bir600 U
FOH Volume Variance= Budgeted FOH – (SP x SQ)
= Bir10,000 - (Bir40 x 262.50) = Bir500 F
***BFOH, annually= 6,000x Bir20= Bir120,000*
*BFOH, monthly= Bir120,000/ 12 months= Bir**10,000***

Q2.

1	2	3	4
SR x SH	SR x RSH**	SR x AH	ARxAH
Class III	8 x 500=4,000	8 x 525=4,200	8 x 550 = 4,400	8.5 x 550=4,675
Class II	7 x 500=3,500	7 x 525=3,675	7 x 650=4,550	7.5 x 650 = 4,875
Class I	5 x 500 =2,500	5x525 = 2,625	5x375 = 1,875	5.4 x 375 = 2,025
	10,000	10,500	10,825	11,575



**RSH: Revised Standard hours = (Standard mix x Actual total DL Hrs used)

RSH for:

	Standard Hours	Standard Mix	Actual Hours	Proportion	RSH
Class III	500	1/3	550	1/3x1, 575	525
Class II	500	1/3	650	1/3x1, 575	525
Class I	500	1/3	375	1/3x1, 575	525
				1,500	

CHAPTER FIVE: RELEVANT INFORMATION AND DECISION MAKING

After studying this chapter, you should be able to:

- ✍ Understand the role of accountants in special decisions
- ✍ Differentiate relevant costs and revenues from irrelevant costs and revenues in any decision situation
- ✍ Distinguish between quantitative factors and qualitative factors in decisions
- ✍ Recognize how to make special order decision
- ✍ Know analysis of make or buy decisions
- ✍ Describe the key concept in choosing which among multiple products to produce when there are capacity constraints
- ✍ Discuss the key factor managers must consider when adding or dropping product lines and segments
- ✍ Explain why the book value of equipment is irrelevant in equipment replacement decisions

5.1. Introduction

During the last decade, increasing competition has forced many companies to refocus their resources and to defend their core businesses against aggressors. In developing strategies to fight this war, managers have generally reached a consensus on two strategic criteria. First, to win a battle, the focus of organizations must be on delivering products and services in the manner most consistent with the desires of customers. Second, no company can do all things well. The strategies managers devise in this intensive struggle evolve from internal evaluations in which the managers identify the functions they must do well to survive. These functions are regarded as core competencies and maintaining leadership in these areas is regarded as vital. All other functions, although important to the organization, are regarded as noncore functions. By intensely focusing on core functions, managers try to maintain a competitive advantage. However, an undesirable consequence of focusing on only the core competencies is that the quality and capabilities of the noncore functions can deteriorate. This deterioration, in turn, can reduce a firm's ability to attract customers to its products and services. Outsourcing the noncore functions to firms that have core competencies in those functions frequently solves the dilemma of maintaining a focus on core competencies while also maintaining excellence in noncore functions. **Managers are charged with the responsibility of managing organizational resources effectively and efficiently relative to the organization's goals and objectives. Making decisions about the use of organizational resources is a key process in which managers fulfill this responsibility. Accounting and finance professionals contribute to the decision-making process by providing expertise and information. Accounting**

information can improve, but not perfect, management understands of the consequences of decision alternatives. To the extent that accounting information can reduce management's uncertainty about economic facts, outcomes, and relationships involved in various courses of action, such information is valuable for decision-making purposes.

Many decisions can be made using *relevant costing,* which focuses managerial attention on a decision's relevant (or pertinent) facts. Relevant costing techniques are applied in virtually all business decisions in both short-term and long-term contexts. This chapter examines their application to several common types of business decisions: replacing an asset, outsourcing a product or part, allocating scarce resources, determining the appropriate sales/production mix, and accepting specially priced orders. In general these decisions require a consideration of costs and benefits that are mismatched in time; that is, the cost is incurred currently but the benefit is derived in future periods. In making a choice among the alternatives available, managers must consider all relevant costs and revenues associated with each alternative

5.2. Information and the Decision Process

Decision making is the process of choosing the best course of action from alternatives available. Decision model is a method used by managers for deciding among courses of action. Accounting information (revenue and cost information) are basic inputs in to decision model. However, other quantitative as well as qualitative information can also be used. In general information is divided in to relevant and irrelevant information. Relevant information is information which is useful for decision making where as irrelevant information is not useful for decision making since such information is common for all alternatives. The management accountant's role in the decision making process is to produce relevant information to the managers who make the decisions. Thus, the primary role of cost accountant in decision process is to: decide what information is relevant to each decision problem, and provide accurate and timely information (data).

Decision making process involves basically the following activities.

i. *Identify and Define the Problem.* The most important phase of decision making process because all other activities in the process depend on this phase. Incorrectly defined problems waste time and resources. That is why it is usually said that defining a problem is solving half of the problem.

ii. *Specify the Criterion.* The phase in which the purpose of decision is to be made. Is the objective to maximize profit, increase market share, minimize cost, or improve public service? For example, cost minimization, increase the quality of product, maximize profit, etc.

iii. *Identify Possible Alternatives*: Determining the possible alternatives is a critical step in the decision process.

iv. *Gathering Relevant Information*. Information could be subjective or objective, internal or external to the organization, historical (past) data, or future (expected) ones.

v. *Making the Decision:* Select the best alternative (course of action).

5.3. The Concept of Relevance

For information to be relevant, it must possess three characteristics: (1) be associated with the decision under consideration, (2) be important to the decision maker, and (3) have a connection to or bearing on some future endeavor.

Association with Decision

Costs or revenues are relevant when they are logically related to a decision and vary from one decision alternative to another. Cost accountants can assist managers in determining which costs and revenues are relevant to decisions at hand. To be relevant, a cost or revenue item must be differential or incremental. An ***incremental revenue*** is the amount of revenue that differs across decision choices and ***incremental cost (differential cost)*** is the amount of cost that varies across the decision choices.

To the extent possible and practical, relevant costing compares the incremental revenues and incremental costs of alternative choices. **Although incremental costs can be variable or fixed, a general guideline is that most variable costs are relevant and most fixed costs are not. The logic of this guideline is that as sales or production volume changes, within the relevant range, variable costs change, but fixed costs do not change**. As with most generalizations, some exceptions can occur in the decision-making process.

The difference between the incremental revenue and the incremental cost of a particular alternative is the positive or negative incremental benefit (incremental profit) of that course of action. Management can compare the incremental benefits of alternatives to decide on the most profitable (or least costly) alternative or set of alternatives.

Some relevant factors, such as sales commissions or prime costs of production, are easily identified and quantified because they are integral parts of the accounting system. Other factors may be relevant and quantifiable, but are not part of the accounting system. Such factors cannot be overlooked simply because they may be more difficult to obtain or may require the use of estimates. For instance, ***opportunity costs*** represent the benefits foregone because one course of action is chosen over another. These costs are extremely important in decision making, but are not included in the accounting records.

Importance to Decision Maker

The need for specific information depends on how important that information is relative to the objectives that a manager wants to achieve. Moreover, if all other factors are equal, more precise information is given greater weight in the decision making process. However, if the information is extremely important, but less precise, the manager must weigh importance against precision.

Bearing on the Future

Information can be based on past or present data, but is relevant only if it pertains to a future decision choice. All managerial decisions are made to affect future events, so the information on which decisions are based should reflect future conditions. The future may be the short run (two hours from now or next month) or the long run (three years from now). Future costs are the only costs that can be avoided, and a longer time horizon equates to more costs that are controllable, avoidable, and relevant. *Only information that has a bearing on future events is relevant in decision making.*

Costs incurred in the past for the acquisition of an asset or resources are called sunk costs. They cannot be changed, no matter what future course of action is taken because past expenditures are not recoverable, regardless of current circumstances. Thus, the historical cost is not relevant to the decision.

***Example*:** Marina Company, a manufacturer of a line of ashtrays, is thinking of using aluminum instead of copper in the manufacture of its product. Historical direct material cost was Br. 0.50 per unit. The company expected future costs for aluminum is Br. 0.40 and it is unchanged for copper. Direct labor cost were Br.0.80 per unit and will not be affected by the switch in materials.

The analysis in a nutshell is as follows:

	Copper	**Aluminum**	**Difference**
Direct material	Br. 0.50	Br. 0.40	Br. 0.10
Direct labor	0.80	0.80	-

In the foregoing analysis, the material cost (the expected future cost of copper compared with expected future cost of aluminum) is the only relevant cost. The material cost met both criteria for relevant information. That is, bearing on the future and an element of difference between the alternatives. However, the direct labor cost will continue to be Br 0.80 per unit regardless of the material used. It is irrelevant because the second criterion – an element of difference between the alternatives – is not met.

5.4. Relevant Information for Specific Decisions

Managers routinely choose a course of action from alternatives that have been identified as feasible solutions to problems. In so doing, managers weight the costs and benefits of these alternatives and determine which course of action is best. Incremental revenues, costs, and benefits of all courses of action

are measured against a baseline alternative. In making decisions, managers must provide for the inclusion of any inherently non quantifiable considerations. Inclusion can be made by attempting to quantify those items or by simply making instinctive value judgments about nonmonetary benefits and costs.

In evaluating courses of action, managers should select the alternative that provides the highest incremental benefit to the company. Rational decision-making behavior includes a comprehensive evaluation of the monetary effects of all alternative courses of action. The chosen course of action should be one that will make the business better off. Decision choices can be evaluated using relevant costing techniques.

5.4.1. Special Order Decisions

One type of decision that affects output level is accepting or rejecting a special order. A special order is a one-time order that is not considered part of the company's normal ongoing business. In general, a special order is profitable as long as the incremental revenue from the special order exceeds the incremental costs of the order. Thus, conditions to consider in a special order decisions are: (i) Customers must be from markets not ordinarily served by the company, and (ii) the company must operate below it maximum productive capacity

Example: Consider the following details of the income statement, on absorption costing basis (that is, both variable and fixed manufacturing costs are included in inventoriable costs and cost of goods sold), of Samson Company for the year just ended December 31, 2014

	Total	per unit
Sales (1,000,000 units)	Br 20,000,000	Br 20
Cost of Goods Sold	15,000,000	15
Gross Margin	Br 5,000,000	Br. 5
Selling and Administrative Expenses	4,000,000	4
Operating Income	Br. 1,000,000	Br. 1

Samson's fixed manufacturing costs were Br 3 million and fixed selling and administrative expenses were Br 2.9 million. Near the end of the year, Ethio Company offered Samson Br 13 per unit for 100,000 unit special order. The special order would not affect Samson's regular business in any way. Furthermore, the special sales order would not affect total fixed costs and would not require any additional variable selling and administrative expenses.

Required:

a) Should Samson accept or reject the special order?
b) Could the special order affect Samson's regular business?

Solution:

a). The correct analysis to the above problem employs the contribution approach to income statement, not the absorption or financial approach- that treats fixed costs, i.e., fixed manufacturing costs as if it were variable.

- Variable manufacturing cost per unit= $\frac{15,000,000 - 3,000,000}{1,000,000}$ = 12per unit
- Total Variable manufacturing cost = Br. 12 x 1,000,000 = Br.12,000,000
- Variable selling and administrative cost per unit= $\frac{4,000,000 - 2,900,000}{1,000,000}$ =1.1per unit
- Total Variable selling and administrative cost = Br. 1.1 x 1, 000, 0000 = Br.1,100,000(the special order does not affect this cost)

The analysis would be as follows on ***comparative contribution income statement***.

	Without special order 1,000,000 units to be sold	**With special order 1,100,000 units to be sold**	**Difference: relevant amount for the 100,000 units of special order**
Sales	Br. 20,000,000	Br. 21,300,00	Br. 1,300,000
Variable Expenses:			
Manufacturing	Br. 12,000,000	Br.13,200,000	Br.1,200,000
Selling and Adm.	1,100,000	1,100,000	
Total Variable Exp.	Br. 13,100,000	Br. 14,300,000	1,200,000
Contribution Margin	Br. 6,900,000	Br. 7,000,000	Br. 100,000
Fixed Expenses:			
Manufacturing	Br. 3,000,000	Br. 3,000,000	
Selling and Adm.	2,900,000	2,900,000	
Total Fixed Expenses	Br.5,900,000	Br. 5,900,000	
Operating Income	Br.1,000,000	Br.1,100,000	Br. 100,000

The above comparative income statements for Samson illustrates two key complete to analyzing relevant revenues for decision: (1) distinguish relevant costs and revenues from irrelevant ones and (2) use the contribution income statement to focus on whether each variable cost and each fixed cost is affected by the alternatives(i.e. reject or accept) under consideration.

In this case, the relevant revenues and costs are the expected future revenues and costs that differ as a result of accepting the special offer ---- sales of Br 1,300,000(Br 13 per unit X 100,000 units) and variable manufacturing costs of Br. 1,200,000 (Br 12 per units X 100,000 units). The fixed manufacturing costs and selling and Administration costs (including variable costs) are irrelevant. That is because these costs will not change in total whether the special order is accepted or rejected. Based on the relevant data

analyzed above, Samson would gain an additional Br100, 000(relevant revenues, Br 1,300,000 less relevant costs Br 1,200,000) in operating income by accepting the special order. In this example, comparing total amounts for 1,000,000 units versus 1,100,000 units or focusing only on the relevant amounts in the difference column in comparative income statement avoids misleading implication --- the implication that would result from comparing the Br 13 per unit selling price against the manufacturing cost per unit of Br 15 (from Samson's income statement on absorption costing basis) which includes both Variable and fixed manufacturing costs.

Thus, based on the relevant data analyzed above, Samson Company should accept the special order because it brings an additional income of Br. 100,000 for the company as:

Income with special order	Br. 1,100,000
Income without special order	1,000,000
Additional income if the order had been accepted	Br. 100,000

b) Yes. Unless Samson Company has effectively segments its market so that the special order to the Ethio Company does not affect the regular business.

5.4.2. Product Line Decisions

This is a decision relating to whether old product lines or other segments of a company should be dropped and new ones added are among the most difficult decision that a manager has to make. Operating results of multiproduct environments are often presented in a disaggregated format that shows results for separate product lines within the organization or division. In reviewing these disaggregated statements, managers must distinguish relevant from irrelevant information regarding individual product lines. If all costs (variable and fixed) are allocated to product lines, a product line or segment may be perceived to be operating at a loss when actually it is not. The commingling of relevant and irrelevant information on the statements may cause such perceptions.

In classifying product line costs, managers should be aware that some costs may appear to be avoidable but are actually not. For example, the salary of a supervisor working directly with a product line appears to be an avoidable fixed cost if the product line is eliminated. However, if this individual has significant experience, the supervisor is often retained and transferred to other areas of the company even if product lines are cut. Determinations such as these needs to be made before costs can be appropriately classified in product line elimination decisions.

For instance, mostly on add or delete decisions, fixed costs are divided into two categories, avoidable and unavoidable. Avoidable costs are costs that will not continue if an ongoing operation is changed, deleted or eliminated. These costs are relevant costs in decision making. Unavoidable costs are costs that continue even if a subunit or an activity is eliminated and are not relevant for decision.

Example: Eyoha Department store has three major departments: groceries, general merchandise, and drugs. Management is considering dropping groceries, which have consistently shown a net loss, as shown below ***on statement of departments' profitability***

analysis of Eyoha.

	Departments			
	Groceries	**General merchandise**	**Drugs**	**Total**
Sales	Br. 100,000	Br. 8,0000	Br. 10,000	Br.190,000
Variable CGS & Expenses	80,000	56000	6,000	142,000
Contribution margin	Br. 20,000	Br. 24000	Br. 4,000	Br. 48,000
Fixed_Expenses:				
Avoidable	Br. 15,000	Br. 10,000	Br. 1,500	Br. 26,500
Unavoidable	6,000	10,000	2,000	18,000
Total fixed expenses	Br.21,000	Br. 20,000	Br.3,500	Br. 44,500
Operating income (loss)	Br. (1,000)	Br.4,000	Br. 500	Br. 3,500

Required:

a) Which alternative would be recommended if the only alternatives to be considered are dropping or continuing the grocery department? Assume that the total assets would be unaffected by the decision and the space made available by dropping groceries would remain idle.

b) Refer the income statement presented above. Assume that the space made available by dropping groceries could be used to expand the general merchandise department. The space would be occupied by merchandise that increase sales by Br. 50,000, generate a 30% contribution margin percentage and have additional avoidable fixed costs of Br.7, 000. Should Eyoha discontinue grocery and expand merchandise department?

Solutions

(a). Analysis for dropping grocery department and leaving the space idle

	(A) Total Before change	(B) Effect of dropping grocery	(A – B) Total after change
Sales	Br. 190.000	Br 100.000	Br 90.000
Variable COGS and Expenses	142.000	80.000	62.000
Contribution margin	Br 48.000	Br 20.000	Br 28.000

In this

Fixed expenses			
Avoidable	Br 26.500	Br 15,000	Br 11,500
Unavoidable	18.000	-	18,000
Total fixed expenses	Br 44,500	Br 15,000	Br 29,500
Operating income (loss)	Br 3,500	Br 5,000	Br (1,500)

analysis, column 2, presents the relevant –revenues and relevant-cost analysis using data from the grocery column in department profitability analysis of Eyoha. Eyoha's operating income will be Br.5, 000 (income with grocery department, Br.3500 less loss assuming grocery is dropped, Br.1500 or it implies that the cost savings from dropping the grocery department, Br.95, 000 (Br.80, 000+ Br.15, 000), will not be enough to offset the loss of Br.100, 000 in revenues. So, under this condition Eyoha's managers should decide to keep the grocery department rather dropping.

Notice that all of the grocery's variable expenses are avoidable and relevant for decision making. If the grocery department is discontinued, the Br 6,000 of the fixed expenses will continue, which is irrelevant. And also note that there is no opportunity costs of using spaces for grocery because without grocery, the space and equipment will remain idle.

(b) Analysis for dropping the grocery department and expanding general merchandise.

	(A) Total before change	(B) Effect of Dropping Groceries	(C) Effect of Expanding General Merchandise	(A – B) + C Total after change
Sales	Br190,000	Br 100,000	Br 50,000	Br 140,000
Variable CGS and expense	142,000	80,000	35,000	97,000
Contribution margin	Br 48,000	Br 20,000	Br 15,000	Br 43,000
Fixed expenses				
Avoidable	Br 26,500	Br 15,000	Br 7,000	Br 18,500
Unavoidable	18,000	-		18,000
Total fixed expenses	Br 44,500	Br 15,000	Br 7,000	Br 36,500
Operating income (loss)	Br 3,500	Br 5,000	Br 8,000	Br 6,500

Effect of expanding general merchandise:

Incremental revenue = Br 50,000

Incremental cost

Variable cost = (1-0.30) x 500,000 = (35,000)

Fixed cost = (7,000)

Incremental income = Br 8,000

Recommendation*:* As the above analysis shows, dropping grocery and using the vacated space to expand general merchandise will be a good decision.

5.4.3. Optimal Use of Scarce Resources Decisions (Product Mix Decisions)

Managers are frequently confronted with the short-run problem of making the best use of scarce resources that are essential to production activity, but are available only in limited quantity. ***Scarce resources*** create constraints on producing goods or providing services and can include machine hours, skilled labor hours, raw materials, and production capacity and other inputs. Management may, in the long run, obtain a greater quantity of a scarce resource. For instance, additional machines could be purchased to increase availability of machine hours. However, in the short run, management must make the most efficient use of the scarce resources it has currently.

Determining the best use of a scarce resource requires managerial recognition of company objectives. If the objective is to maximize company profits, a scarce resource is best used to produce and sell the product having the highest contribution margin ***per unit of the scarce resource.*** This strategy assumes that the company is faced with only one scarce resource. A scarce resource or a limiting factor refers to any factor that restrict or constraint the production or sale of a product or service.

Example: Jimma Computers manufactured two products, desktop computer and notebook computer. The Company's scarce resource is a data chip that it purchases from a supplier. Each desktop computer requires one chip and each notebook computer requires three chips. Currently, the firm has access to only 5,100 chips per month to make either desktop or notebook computers or some combination of both. Demand is above 5,100 units per month for both products and there is no variable selling or administrative costs related to either product. The desktop's Br. 650 selling price less its Br. 545 variable cost provides a contribution margin of Br. 105 per unit. The notebook's contribution margin per unit is Br.180 (Br.900 selling price minus Br.720 variable cost). Fixed annual overhead related to these two product lines totals Br. 6,570,000 and is allocated to products for purposes of inventory valuation. Fixed overhead, however, does not change with production levels within the relevant range

Instructions: on the bases of the above information which product is more profitable and on which products should the firm spend its resources?

Solution:

Present information on two products being manufactured by Jimma Computers and total contribution margin per unit and per chip would be:

Descriptions	**Desktop**	**Notebook**
Selling price per unit (a)	Br 650	Br 900
Variable production cost per unit:		
Direct material	Br.345 115	Br. 480
Direct labor	85 Br. 545	125
Variable overhead		115
Total variable cost (b)		Br. 20
Unit contribution margin [(c) = (a) _ (b)]	Br 105	Br.180
Chips required per unit (d)	1	3
Contribution margin per chip of per unit [(c) /(d)]	Br.105	Br.60

In the above analysis, because fixed overhead per unit is not relevant in the short run, unit contribution margin rather than unit gross margin is the appropriate measure of profitability of the two products. Unit contribution margin is divided by the input quantity of the scarce resource (in this case, data chips) to obtain the contribution margin per unit of scarce resource. The last line in the above analysis table shows the Br. 105 contribution margin per chip for the desktop compared to Br. 60 for the notebook. Thus, it is more profitable for Jimma Computers to produce desktop computers than notebooks.

At first glance, it would appear that the notebook would be, by a substantial margin, the more profitable of the two products because its contribution margin per unit (Br. 180) is significantly higher than that of the desktop (Br. 105). However, because the notebook requires three times as many chips as the desktop, a greater amount of contribution margin per chip is generated by the production of the desktops. If these were the only two products made by Jimma Computers and the company wanted to achieve the highest possible profit, it would dedicate all available data chips to the production of desktops. Such a strategy would provide a total contribution margin of Br. 535,500 per month (5,100 units * Br. 105), if all units produced were sold.

In addition to considering the monetary effects related to scarce resource decisions, managers must remember that all factors cannot be readily quantified and the qualitative aspects of the situation must be evaluated in addition to the quantitative ones. For example, before choosing to produce only desktops,

Jimma Computers' managers would need to assess the potential damage to the firm's reputation and markets if the company limited its product line to a single item. Such a choice severely restricts its customer base and is especially important if the currently manufactured products are competitively related

5.4.4. Make or Buy (In source or out sourcing) decision

A concern with subcontracting or outsourcing has dominated business in recent years as the cost of providing goods and services in-house is increasingly compared to the cost of purchasing goods on the open market. Thus, a daily question faced by managers is whether the right components and services will be available at the right time to ensure that production can occur. Additionally, the inputs must be of the appropriate quality and obtainable at a reasonable price. Traditionally, companies ensured themselves of service and part availability and quality by controlling all functions internally. However, there is a growing trend toward "outsourcing" (buying) a greater percentage of required materials, components, and services.

This ***outsourcing decision (make-or-buy decision***) is made only after an analysis that compares internal production and opportunity costs with purchase cost and assesses the best uses of available facilities. Consideration of an in source (make) option implies that the company has available capacity for that purpose or has considered the cost of obtaining the necessary capacity. The make versus buy decision should be based on which alternative is less costly on a relevant cost basis; that is, taking into account only future, incremental cash flows. In other words, in a make or buy situation with no limiting factors, the relevant costs for the decision are the differential costs between the two options.

For example, the costs of in-house production of a computer processing service that averages 10,000 transactions per month are calculated as Br. 25,000 per month. This comprises Br.0.50 per transaction for stationery and Br. 2 per transaction for labor. In addition, there is a Br. 10,000 charge from head office as the share of the depreciation charge for equipment. An independent computer bureau has tendered a fixed price of Br. 20,000 per month.

Based on this information, stationery and labor costs are variable costs that are both avoidable if processing is outsourced. The depreciation charge is likely to be a fixed cost to the business irrespective of the outsourcing decision. It is therefore unavoidable. The fixed outsourcing cost will only be incurred if outsourcing takes place.

The relevant costs for each alternative can be compared as shown in Table 6.1 below. The Br. 10,000 share of depreciation costs is not relevant as it is unavoidable. The relevant costs for this decision are therefore those shown in Table 6.2

Based on relevant costs, there would be a Br. 5,000 per month saving by outsourcing the computer processing service.

Table 1 Relevant costs – make versus buy

	Cost to make	Cost to buy
Stationery 10,000 @ Br. 0.50	Br. 5,000	
Labour 10,000 @ Br. 2	20,000	
Share of depreciation costs	10,000	10,000
Outsourcing cost		20,000
Total relevant cost	Br. 35,000	Br. 30,000

Table 2Relevant costs – make versus buy, simplified

Relevant cost to makeRelevant cost to buy		
Stationery 10,000 @ Br. 0.50	Br. 5,000	
Labour 10,000 @ Br. 2	20,000	
Outsourcing cost		20,000
Total relevant cost	Br. 25,000	Br. 20,000

Note that relevant information for make or buy decision includes both quantitative and qualitative factors. Such as:

Quantitative Factors	
Buy	Make
• the amount paid to supplier	• variable costs incurred to produce the component
• transportation costs	• special equipment to produce the product
• costs incurred to process the part upon receipt	• hire additional supervisory personnel to assist with making the product

Qualitative Factors

- Advantage of long term relationship with suppliers
- Possibility of shortage of material or labor for making the component
- Uninterrupted supply of requisite quality from reliable supplies
- The quality of the product is decided to be controlled
- If the purchase price is likely to rise due to increased demand in the market, it becomes uneconomical to buy
- Where the technical know-how is to be kept secret and not to be passed on to the suppliers

5.4.5. Keep or Replace Equipment Decisions

The usefulness of plant assets may be impaired long before they are considered to be worn out. Equipment may be no longer being efficient for the purpose for which it is used. On the other hand, the equipment may not have reached the point of complete inadequacy. Decisions to replace usable plants assets should be based on studies of relevant costs. The relevant costs are the future costs of continuing to use the equipment versus replacement. The book values of the plant assets being replaced are sunk costs and are irrelevant.

As for example, assume that a business is considered disposing of several identical machines having a total book value of Birr 1,000,000 and an estimated remaining life of five years. The old machines can be sold for Birr 25,000. They can be replaced by a single high-speed machine at a cost of Birr 250,000. The new machine has an estimated useful life of five years and no residual value. Analyses indicate an estimated annual reduction in variable manufacturing costs from Birr 225,000, with the old machine to Birr 150,000 with the new machine. No other changes in the manufacturing costs or the operating expenses are expected. The relevant costs are summarized in the differential report are as follows:

Proposal for Replacement Equipment (Differential Analysis Report – Replacement Equipment):

Annual variable costs of present equipment (a)	Birr 225,000
Annual variable costs - new equipment (b)	150,000
Annual differential decrease in cost(c= a-b)	Birr 75,000
Number of years applicable (d)	5
Total differential decrease in cost (e=cxd)	Birr 375,000
Proceed from sales of present equipment (f)	25,000
total (g =e+f)	Birr 4, 00,000
Cost of new equipment (h)	2, 50,000

Net differential decrease in cost, 5 year total (i =g+h)	Birr 1, 50,000
So, annual net differential decrease in cost – new equipment (i÷d)	Birr 30,000

Additional factors are often involved in equipment replacement decisions. For example, differences between the remaining useful life of the old equipment and the estimated life of the new equipment could exist. In addition, the new equipment might improve the overall quality of the product, resulting in an increase in sales volume. Other factors that could be significant include the time value of money and other uses for the cash needed to purchase the new equipment.

In general, in deciding whether to replace or keep existing equipment, four commonly encountered items considered in relevance:

i. Book value of old equipment: irrelevant, because it is a past (historical) cost. Therefore, depreciation on old equipment irrelevant.
ii. Disposal value of old equipment: relevant, because it is an expected future inflow that usually differs among alternatives.
iii. Gain or loss on disposal: this is the algebraic difference between book value and disposal value. It is therefore, a meaningless combination of irrelevant and relevant items. Consequently, it is best to think of each separately.
iv. Cost of new equipment: relevant, because it is an expected future outflow that will differ among alternatives. Therefore, depreciation on new equipment is relevant.

5.5. Pricing Decisions

Companies are constantly making product and service pricing decision. These are strategic decision that affects the quantity produced and sold, and therefore cost and revenues. To make these decisions, managers need to understand cost behavior pattern and cost drivers. They can then evaluate demand at different prices and manage costs across the value chain and over a products life cycle to achieve profitability.

Major influences on pricing decision

How companies prices a product or a service ultimately depends on the demand and supply of it. Three influences on demand and supply are:-

i. Customers: - customer influences price through their effect on the demand for a product or services, based on factors such as the features of a product and its quality.
ii. Competitors: when there are competitors, knowledge of rivals' technology, plant capacity, and operating policies enables a company to estimate its competitors' costs-valuable information in setting its own prices.

iii. Costs – costs influence prices because they affect supply. As companies supply more product the cost of producing each additional unit initially declines but then eventually increase managers who understand the cost of producing their companies product set polices that make the products attractive to customers. In computing the relevant costs for a pricing decision, the manager must consider relevant costs in all business functions of the value chain.

Costing and pricing for the short run

Short-run pricing decisions typically have a time horizon of less than a year and include decision such as (a) pricing one time only special order with no long run implications and (b) adjusting product mix and output volume in a competitive market.

Company's short run pricing decisions need identify a sufficiently low price at which company would still make a profit and assumed that (a) company has access to extra capacity and (b) a competitor with an efficient plant and idle capacity was likely to make a low bid. However, short run pricing does not always work this way. Companies may experience strong demand for their products in the short-run, but they may have limited capacity. In these cases, companies strategically increase prices in the short run to as much as the market will bear.

In general, short run pricing decisions are responses to short-run demand and supply condition, and the relevant costs are only those costs that will change in the short run.

Costing and pricing for the long run

Long run pricing decisions have a time horizon of a year or longer and include pricing a product in a major market in which there is some see way in setting price. Two key differences affect pricing for the long run versus the short run:-

1. Costs that are often irrelevant for short run pricing decisions, such as fixed costs that cannot be changed, are generally relevant in the long run because cost can be altered in the long run.
2. Profit margins in the long run pricing decision are often set to earn a reasonable return on investment. Short run is opportunistic, prices are decreased when demand is weak and increased when demand is strong.

Long run pricing is a strategic decision desired to build long run relationship with customers based on stable and predictable prices. But to change a stable price and earn the target long run return, a company must, over the long run, know and manage its costs of supplying product to customers. Thus, relevant costs for long run pricing decision include all future fixed and variable costs.

Long run pricing approaches

Two different approaches for pricing decision using product cost information are:-

1. Market based approach
2. Cost based/cost plus approach

1. Market based pricing

Market based pricing approach starts by management asking, given that our customers want and how our competitors will react to what we do, what price should we charge?

Companies operating in a very competitive market, for example, commodities such as steel, oil, and natural gas, use the market based pricing. An important form of market based pricing is target pricing. Target price is the estimated price for a product or service that potential customers will be willing to pay. This estimate is based on an understanding of customer's perceived value for a product or service and how competitors will price competing product or service.

Hence, target operating income is the operating income that a company wants to earn on each unit of a product or service sold and target price leads to a target cost, target cost per unit is the estimated long run cost per unit of a product or service that, when sold at the target price, enables the company to achieve the target operating income.

Thus, Target price - Target operating income = Target cost

Implementing target pricing and target costing

In developing target prices and target cost companies may require to follow the following five steps:

- Develop a product that satisfy the needs of potential customers
- Choose a target price based on customer's perceived value for the product and the price competitors charge, and target operating income per unit.
- Drive a target cost per unit by subtracting the target operating income per unit from the target price
- Perform cost analysis to analyze which aspects of a product or service to target for cost reduction.
- Perform value engineering to achieve target cost. Value engineering is a systematic evaluation of all aspect of the value chain business function with the objective of reducing cost while satisfying customers' needs. Value engineering can result in improvement in product design, change in material specification, and modification in process method. In this case, Costs can be value adding or non value adding. Value adding costs are costs that costumers perceive as adding utility or value while non value adding cost that do not add value to the product and to customers. Value

engineering will focuses on eliminating non value adding cost and reduce as much as possible value adding cost without affecting quality of the product and customers satisfaction.

Example: Astel Company is a manufacturer of personal computer .Astel expects its competitors to lower prices of PC. Astels management believes that it must respond by reducing price by 20% from Br. 1000 per unit to Br.800 per unit. At this low price, Astels marketing manager forecast an increase in annual sales from 150,000 to 200,000 units. Astel management wants a 10% target operating income on sales revenue. The total production cost at the moment for 150,000 units is Br. 135 million.

Required compute

a) The total target revenue
b) Total target operating income
c) Target operating income per unit
d) Current target cost per unit

Solution

a) Total target revenue = target price per unit x target annual unit sold
   = Br.800 per unit x 200,000 units = Br.160, 000,000
b) Total target operating income= target rate x Total target revenue
   = 10% x Br.160, 000,000= Br.16, 000,000
c) Target operating income per unit= Total target operating income/ annual unit sold
   = Br.16, 000,000/200,000 units = Br.80
d) Current cost per unit= target price per unit less target operating income per unit
   = Br.800 per unit - Br.80 = Br.720

2. Cost-plus pricing

Accounting information may be used in pricing decisions, particularly where the firm is a market leader or *price-maker*. In these cases, firms may adopt ***cost-plus pricing***, in which a margin is added to the total product/service cost in order to determine the selling price. In many organizations, however, prices are set by market leaders and competition requires that prices follow the market (i.e. the firms are *price-takers*). Nevertheless, even in those cases an understanding of cost helps in making management decisions about what product/services to produce, how many units to make and whether the price that exists in the market warrants the business risk involved in any decision to sell in that market. An understanding of the firm's marketing strategy is therefore, essential in using cost information for pricing decisions.

In the long term, the prices that businesses charge must cover all of its costs. If it is unable to do so, it will make losses and may not survive. For every product/service, the full cost must be calculated, to which the

desired profit margin is added. Full **cost** includes an allocation to each product/service of all the costs of the business, including producing and delivering a good or service, and all its marketing, selling, finance and administration costs.

The general formula for setting a cost based price adds a markup component to the *cost base to determine the prospective selling price. One way to determine the markup* percentage is to choose a markup to earn a target rate of return on investment.

The target rate of return on investment is the target annul operating income that an organization aims to achieve divided by invested capital (asset)

$$\text{i.e. TRR} = \frac{\text{Target operating income}}{\text{Invested capital}}$$

Therefore, Target operating income=TRR*Invested capital

Let illustrate a cost – plus pricing formula on top company. Assume top's engineers have redesigned product CD into 2CD and that top uses a 12% markup on the full unit cost of the product in developing the prospective selling price. The target product 2CD profitability for 2000 is as follows:

	Estimated total amounts for 200,000 units (1)	**Estimated total amount per unit (2) = (1) ÷ 200,000**
Revenues	**Bir 160,000,000**	**Bir 800**
Cost of goods sold	**108,000,000**	**540**
Operating costs	**36,000,000**	**180**
Total cost of product	**Bir 144,000,000**	**720**
Operating income	**16,000,000**	**Bir 80**

Suppose that top's target rate of return on investment is 18% and 2CD's capital investment is Bir 96 million. The target annual operating income for 2CD is:

Invested capital …….. Bir 96,000,000

Target rate of return on investment……. 18%

Target Annual Operating income [0.18 ×Bir 96mln]…Bir17,280,000

Target operating income per unit of 2A

[Bir17,280,000 ÷ 200,000 units] ……. Bir 86.40

This calculation indicates that top needs to earn a target operating income of Bir86.40 on each unit of 2A. The mark up of Bir 86.40 expressed as a percentage of the full production cost per unit of Bir720 equals 12% (Bir 86.40 ÷Bir 720]

Thus the prospective selling price of product 2A is Bir806.40 (Full unit cost of 2A, Bir 720 plus the markup component of 12% (0.12 ×Bir 720=Bir 86.40).

5.6. Summary

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

1. The five-step decision process is (a) obtain information, (b) make predictions, (c) choose alternative courses of action, (d) implement decisions, and (c) evaluate performance.

2. To be relevant to a particular decision, a revenue or cost must meet two criteria: (a) It must be an expected future revenue or cost, and (b) it must differ among alternative courses of action.

3. 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.

4. 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.

5 . 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).

6. Managers should ignore allocated overhead costs when making decisions about dropping and adding customers and segments. They should focus instead on how total costs differ across alternatives.

7. The book value of existing equipment in equipment-replacement decisions represents past (historical) cost and therefore is irrelevant.

5.7. Review Questions

WORKOUT QUESTIONS

1) Belt and Braces Ltd makes a single product which sells for Br 20. It has a full cost of Br 15 which is made up as follows:

Direct Material	Br 4
Direct Labor	6
Variable Overhead	2
General Fixed Overhead	3
	Br. 15

The labor force is currently working at 90% of capacity and so there is a spare capacity for 2,000 units. A customer has approached the company with a request for the manufacture of a special order of 2,000 units for which he is willing to pay Br. 25,000. Assess whether the contract should be accepted or not.

2) Buster Ltd makes four components, W, X, Y and Z, for which costs in the forthcoming year are expected to be as follows.

	W	**X**	**Y**	**Z**
Production (units)	1,000	2,000	4,000	3,000
Unit variable costs				
Direct materials	Br. 4	Br 5	Br 2	Br 4
Direct labor	8	9	4	6
Variable production overheads	2	3	1	2
	Br 14	Br 17	Br 7	Br 12

attributable fixed cost per annum and other fixed costs are as follows:

Incurred as a direct consequence of making W	Br 1,000
Incurred as a direct consequence of making X	5,000
Incurred as a direct consequence of making Y	6,000
Incurred as a direct consequence of making Z	8,000
Other fixed costs (committed) 30,000	
Total fixed costs	Br 50,000

A subcontractor has offered to supply units of W, X, Y and Z for Br 12, Br 21, Br 10, and Br 14 respectively.

Required: Decide whether Buster Ltd should make or buy the components and mention some qualitative factors to be considered by Buster Ltd in decision making

3) Great Company manufacturers 60,000 units of part XL – 40:

	Total costs 60,000 units	Cost per unit
Direct material	Br 480,000	Br 8
Direct labor	360,000	6
Variable factory overhead (FOH)	180,000	3
Fixed FOH	360,000	6
Total manufacturing costs	Br 1,380,000	Br 23

Another manufacturer has offered to sell the same part to Great for Br 21 each. The fixed overhead consists of depreciation, property taxes, insurance, and supervisory salaries. The entire fixed overhead would continue if the Great Company bought the component except that the cost of Br 120,000 pertaining to some supervisory and custodial personnel could be avoided.

Required:

a. Should the parts be made or bought? Assume that the capacity now used to make parts internally will become idle if the pats are purchased?

b. Assume that the capacity now used to make parts will be either (i) be rented to nearby manufacturer for Br 60,000 for the year or (ii) be used to make another product that will yield a profit contribution of Br 250,000 per year. Should the company purchase them from the outside supplier?

SOLUTIONS FOR WORKOUT QUESIONS

Q1

	Br.	Br.
Value of order		25,000
Cost of order		
Direct materials (Br. 4 x 2,000)	8,000	
Direct labor (Br. 6 x 2,000)	12,000	
Variable overhead (Br 2 x 2,000)	4,000	
Relevant cost of order		(24,000)
Profit form order acceptance		1,000

Fixed costs will be incurred regardless of whether the special order is accepted and so are not relevant to the decision. The contract should be accepted since it increases contribution to profit by Br 1, 000.

Other factors to be consider in the special order decision.

a) The acceptance of the special order at a lower price may lead other customers to demand lower prices as well.
b) There may be more profitable ways of using the spare capacity.
c) Accepting the special order may lock up capacity that could be used for future full-price business.
d) Fixed costs may exist, in fact, if the contract is accepted.

Q2

a. The relevant cots are the differential costs between making and buying, and they consist of difference in unit variable costs plus differences in directly attributable fixed costs. Subcontracting will result in some fixed cost savings.

	W	X	Y	Z
Unit variable cost of making	Br. 14	Br 17	Br 7	Br 12
Unit variable cost of buying	1221 1014			
	Br (2)	Br 4	Br 3	Br 2
	W	X	Y	Z
Annual requirements (units)	1,000	2,000	4,000	3,000
Extra variable cost of buying (per annum)	Br. (2,000)	Br. 8,000	Br.12, 000	Br. 6,000
Fixed costs saved by buying	(1,000)	(5,000)	(6,000)	(8,000)
Extra total cost of buying	(3,000)	3,000	6,000	(2,000)

b. The company would save Br 3,000 by subcontracting component W (where the purchase cost would be less than the variable cost per unit to make internally) and would save Br 2,000 by subcontracting component Z (because of the savings in fixed costs of Br 8,000).

c. In this question, relevant costs are the variable cots in-house manufacture the variable costs of subcontracted units, and the saving in fixed costs.

Q3

To approach the decision form a financial point of view, the manager must focus on the relevant or different costs. The differential cost can be obtained by eliminating from the cost data those costs that are not avoidable – that is, by eliminating the sunk costs and the future costs will continue regardless of whether the parts XL – 40 are produced internally or purchased from outside. Thus, the relevant cost computation follows:

	Cost To Make		Cost To Buy	
	Per unit	Total	Per unit	Total
Purchase Cost	- 0 -	- 0 -	21.00	1,260,000
Direct materials	Br 8.00	Br 480,000		
Direct labor	6.00	360,000		
Variable FOH	3.00	180,000		
Fixed FOH, avoidable	2.00	120,000		
Total cost	Br 19.00	Br 1,140,000	Br 21.00	Br 1,260,000

Recommendation: Great Company should reject the outside supplier's offer because it costs Br 2 less per unit to continue to make the part – XL – 40.

Relevant costs	Per unit
Cost to buy	Br 21.00
Cost to make	19.00
Advantage of making the part internally	Br 2.00

Total advantage = Br 2.00 x 60,000units = Br 120,000

a. Assuming the space now being used to produce part XL – 40 would be
   i. Rented to a nearby manufacture of Br 60,000 per annum or
   ii. Used to produce other product that contributes a profit of Br 250,000 per year, the relevant cost computation follows:

	Make	Buy and Leave Facility Idle	Buy and Rent out	Buy and Produce Other Product
Cost to obtain parts	Br1,140,000	Br1,260,000	Br1,260,000	Br 1,260,000
Contribution from other products	-	-	-	(250,000)
Rent revenue	-	-	(60,000)	
Net relevant costs	Br1,140,000	Br1,260,000	B1 ,200,000	Br 1,010,000

Great Company would be better off through accepting the supplier's offer and to using the available facility to produce the new product line. This move has the least net relevant cost of Br 1,010,000.

CHAPTER 6: DECENTRALIZATION AND TRANSFER PRICING

After studying this chapter, you should be able to:

- ✓ Describe a management control system
- ✓ Recognize important elements of effective management control systems Describe the benefits and costs of decentralization
- ✓ Identify three general methods for determining transfer prices and understand how a transfer-pricing method can affect the operating profit of individual subunits
- ✓ Illustrate how market-based transfer prices generally promote goal congruence in perfectly competitive markets
- ✓ Recognize why a transfer price may lead to suboptimal decisions Understand the range over which two divisions generally negotiate the transfer price when there is excess capacity
- ✓ Present a general guideline for determining a minimum transfer price in transfer-pricing situations

- ✓ Recognize income tax considerations in multinational transfer pricing

6.1. Introduction

A management control system is a means of gathering and using information to aid and coordinate the planning and control decisions throughout an organization and to guide the behavior of its managers and other employees. In a small business, virtually all plans and decisions can be made by one individual. As a business grows or its operation become more diverse, it becomes difficult, if not impossible for one individual to perform these functions.

Management accounts, therefore, must have the interpersonal and analytical skills necessary to evaluate and implement management control system, as well as the ability to interpret out puts of these systems, and to be effective, management control systems should be closely aligned to the company's strategies and goals and also must fit an organizations structure.

6.2. Decentralization

As a business grows, it is difficult for one manager to manage the whole activity. Hence, they need to delegate responsibility for portions of operation. This separation of a business in to more manageable units is termed as ***Decentralization,*** the freedom of manager at lower levels of the organization to make decision**.** The process of measuring and reporting operating activity by area of responsibility is called responsibility accounting.

Benefit of Decentralization	Limitation of Decentralization
Create greater response to local needs Quicker decision making Increase motivation Increase creativity and productivity Aids management development Sharpens the focuses of managers	Suboptimal decision Duplication of asset & activity Decrease loyalty to the organization as a whole Increase cost of gathering information

6.3. Transfer Pricing

In decentralized organizations, much of the decision, making power resides in its individual submits. In these cases, the management control system often uses transfer prices to coordinate the actions of the subunit and to evaluate their performance.

A transfer price is the price one subunit (department or division) charges for a product or service supplied to another subunit of the same organization. If, for example, a car manufacturer has a separate division that manufactures engines, the transfer price is the price the engine division charges when it transfers engine to the assembly division. The transfer price creates revenues for the selling subunit (the engine division in our example) and purchase cost for the buying subunits (the assembly division), affecting each subunit operating income. These operating incomes can be used to evaluate subunits performance and to motivate their manager. The products or services transferred between sbunits of the organization are called intermediate products. These products may either be further worked on by the receiving subunit or, if transferred from production to marketing, sold to an external customer.

The three methods for determining transfer pricing are

1. **Market-based transfer prices**

   In this case, top management may choose to use the price of a similar product or service publicly listed, say, a trade association web site. Also top management may select, for the internal price, the external price that subunit charges to outsider customers. This method is preferred, (a) when the intermediate market is perfectly competitive, (b) Interdependence of sub units is minimal, and (c) There are no other additional costs of using market price.

2. **Cost-based transfer price**:

   Top management may choose a transfer price based on the cost of producing the product in question. The cost used in the cost based transfer price can be the actual cost or the budgeted cost. Sometimes, the cost based transfer price includes the mark up or profit margin that represents a return on subunit investment. This method is used when market price is unavailable, inappropriate or too costly to obtain. In this case, variable of full cost can be used as a base

3. **Negotiated transfer price**

   In some cases, the subunit of the company are free to negotiate the transfer price between themselves and then to decide whether to buy and sell internally or dealing with external prices. Subunit may use information about costs and market price in these negotiations, but there is no requirement that the chosen transfer price bear any specific relationship to either cost or market price data. Thus, negotiated transfer price is the outcome of a bargaining process between the selling and buying divisions.

Example 6.1:

Horizon Petroleum Company has two divisions. Each division operates as a profit center. The transportation division manages the operation of pipeline that transfers crude oil from Mexico to Texas. The refining division manages a refining at Texas that process crude oil in to gasoline. Gasoline is the only salable product the refinery makes and that it takes two barrels of crude oil to yield one barrel of gasoline

Variable cost in each division is assumed to be variable with respect to single cost driver in each division: Barrels of crude oil transported by the transportation division, barrel of gasoline produced by the refining division. The fixed cost per unit is based on the budgeted annual output of crude oil to be produced and transferred and the amount of gasoline to be produced. Horizon petroleum reports all costs and revenues of its non US operation in US dollars using the prevailing exchange rate.

	Transport Division	Refining Division
VC per unit	Bir 1	Bir 8
FC per unit	3	6
Total	Bir 4	Bir 14

Additional information's

- The production division can sell crude oil to transport division in Mexico at Bir12 per barrel
- The transport division buys crude oil from the production division in Mexico and sells it to the refining division
- The refining division can buy crude oil in Texas from external supplier at Bir21 per barrel and can sell the gasoline it produces at Bir58per barrel.
- The three divisions have sufficient capacity

Assume that 100 barrel of crude oil produced by production division is transported to the refining division and assuming the following transfer pricing methods

Method A: Market based transfer price of Bir21 per barrel of crude oil based on the competitive market price

Method B: Cost based transfer price at 110% of full cost where full cost are the cost of transferred in product plus the divisions own variable and fixed cost.

Method C: Negotiated transfer price of Bir19.75 per barrel crude oil

Required

Compute the operating income for Horizon Petroleum Company and for each division under each transfer pricing method.

Solution

i) *Horizon* Petroleum total operating income from purchasing, transporting and refining the 100 barrels of crude oil and selling of the 50 barrels of gasoline is the same, Bir600, regardless of the internal transfer price used.

Thus, Operating income would be:

Revenues: (Bir58x50 barrels of gasoline)……Bir 2, 900
Less: cost of crude oil purchases (Bir12x100) barrels of crude oil)……Bir 1,200
Transportation cost (Bir4(1+3) x100 barrels of crude oil)….. 400
Refining costs (Bir14(6+8) x50 barrels of gasoline)……. 700 2,300
Operating income……. Bir600

ii) Division operating income of horizon petroleum for 100 barrels of crude oil under alternative transfer pricing methods would be:

	Internal transfers at market price of Bir21/barrel	**Internal transfer at 110% of full cost = Bir17.60**	**Internal transfer at negotiated price Bir19.25**
Transportation division			
Revenues, (a)	Bir21x100 = Bir2,100	Bir17.60x100 = Bir1760	Bir19.25x100=Bir1,925
Costs:			
Crude oil purchase costs (Bir12x100)	Bir1200	Bir1200	Bir1200
Division VC (Bir1x100)	100	100	100
Division FC(Bir3x100)	300	300	300
Total division costs (b)	Bir1600	1600	Bir1600
Division operating income(a-b)	Bir500	Bir160	Bir325
Refining Division			
Revenues (Bir58x50 barrels of gas oil)	Bir2900	Bir2900	Bir2900
Costs:			
Transportation in cost	Bir21x100 = Bir2,100	1,760	1,925
Division VC (Bir8x50)	400	400	400
Division FC(Bir6x50)	300	300	300
Total division costs (b)	Bir2800	Bir2460	Bir2625
Division operating income (a-b)	Bir100	Bir440	Bir275
Operating income of both division	Bir600	Bir600	Bir600

6.4. Summary

1 A management control system is a means of gathering and using information to aid and coordinate the process of making planning and control decisions throughout the organization, and to guide employee behavior.

2 Effective management control systems are closely aligned to the organization's strategy, fit the organization's structure, and motivate managers and employees to give effort to achieve the organization's goals.

3 The benefits of decentralization include (a) greater responsiveness to local needs, (b) gains from quicker decision making, (c) increased motivation of subunit managers, (d) greater management development and learning, and (e) sharper management focus. The costs of decentralization include (a), dysfunctional decision making (control loss),

(b) Duplication of activities, (C) decreased Loyalty towards the organization, and (d) increased costs of information gathering.

4 Transfer prices can be (a) market-based, (b) cost-based, or (c) negotiated. Different transfer-pricing methods produce different revenues and costs for individual subunits, and hence different operating profits for them.

5 In perfectly competitive markets, there is no idle capacity, and division managers can buy and sell as much as they want at the market price. Setting the transfer price at the market price motivates division managers to deal internally and to take exactly the same actions as they would if they were dealing in the external market.

6 A transfer price based on full cost plus a mark-up may lead to suboptimal decisions because it leads the 'buying' division to regard the fixed costs and the mark-up of the selling division as variable costs.

7 When there is excess capacity, the transfer price range for negotiations generally lies between the minimum price at which the selling division is willing to sell (its variable costs) and the maximum price the buying division is willing to pay (the price at which the product is available from outside suppliers).

8 The general guideline for transfer pricing states that the minimum transfer price equals the incremental costs per unit incurred up to the point of transfer plus the opportunity costs per unit to the supplying division resulting from transferring products or services internally.

9 Transfer prices can reduce income tax payments by recognizing higher profits in low-tax-rate countries and lower profits in high-tax-rate countries.

6.5. Revision exercises

1. What is management control system and how should it be desired?
2. What are the benefits and costs of decentralization?
3. What is a transfer price and what is it intended to achieve?
4. What methods can be used to calculate transfer prices?

WOLLO UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ACCOUNTING AND FINANCE

ASSIGNMENT FOR THE COURSE COST AND MANAGEMENT ACCOUNTING II

1. **Student's name…….**
2. **Id. No…….**
3. **Tutor's name and signature**

PART I- DEAR LEARNERS! BREIFLY ANSWER THE FOLOWING QUESTIONS

1. A transfer pricing situation usually involves three questions or decisions. What are they? Briefly explain

2. Discuss the general methods for determining transfer price

3. Compare and contrast flexible budget and static budget

4. What are the assumptions need to be considered in CVP analysis?

5. Diagrammatically, Explain relations ships among components of master budget.

PART II- DEAR LEARNERS! WORK OUT THE FOLLWING BY SHOWING THE NECESSARY STEPS AND COMPUTATIONS

1. Zola Company uses standard costs and flexible budget. The purchasing agent is responsible for material price variance and the production manager is responsible for all other variances. Operating data for the past week are summarized as follows;

Finished units produced…….5,000

Direct material: purchases…….10,000 pounds at birr 15 per pound; standard allowed per unit produced, 1 pound at birr 16 per pound and 5,400 pounds are actually used.

Direct labour: actual costs, 8,000 hours at birr 30.50, standard allowed per good unit produced, 1 ½ hours; standard price per direct labour hour, birr 30

Variable manufacturing: actual costs, birr 88,000. Budget formula is birr 10 per standard direct labour hour.

Required: compute

- **A.** Material purchase price variance
- **B.** Material efficiency variance
- **C.** Direct labour price variance
- **D.** Direct labour efficiency variance
- **E.** Variable manufacturing over head spending variance
- **F.** Variable manufacturing over head spending variance

2. The balance sheet of Adama Super market on Sene 30, 2001 is as follows

Assets

Cash birr……..8,000

A/receivable (net of uncollectible birr 2,000)…….38,000

Inventory……..6,000
Plant assets……birr 100,000
Less:Accumulated Depreciation……60,000 .40,000
Total assets……birr 102,000
Liability and capital
A/payable……birr, 82,500
Adama Capital…….19,250
Total liabilities and capital birr……..102,000
Additional information;
A) sales are budgeted as follows;
Hamle……birr 110,000
Nehassie……....120,000
B) collections are xpected to be 60 % in the month of sale , 38 % the next month, and 2% uncollectible

C) The gross profit is 1/3 of cost of goods sold. Purchases each month are 75 % of the next months projected sales. The purchases are paid in full the next month.

D) Other costs for each month, paid in cash, are expected to be birr 16,500. depreciation each month is birr 5,000

Required: determine;
a) the budgeted cash collection for Hamle, 2001

b) the budgeted income(loss) before income taxes for Hamle 2001

c) the projected balance f A/payable on Hamle 30,2001

3. The following standard costs pertains to a component part manufactured by GYB Company. Direct materials…….birr 4
Direct labour……6
Applied factory over head……..20
Standard cost per unit……..birr 30
Factory over head is applied at birr 1 per standard machine hour. Fixed capacity cost is 40% of applied factory over head and is not affected by any make or buys decision. It would cost birr 25 per unit to buy the 10,000 units of parts from outside supplier. The company can rent the idle facility will be used to make the parts and earns annual rent income of birr 20,000. the company also will incur supervisors salary of birr 10,000 if it make the parts.

Required; which option is better? Make or buy? What qualitative factors do you consider before final make or buy decision is made?

4. Pappy Company manufactures a product that sell for birr 20 each. Variable costs are 12 per unit. Fixed costs for the relevant range of (0-100,000) units amounted to birr 252,000. Sales for the year ended December 31, 2009 amounted to 40,000 units.
Required:
a) Compute the company's break even sales in birr and in units using equation, contribution and graphic approach.

b) For next year, variable costs are expected to increase by 10 %; determine the new break even sales and the expected income for the coming year if the company can sale 50,000 units.

5. Tommy & Associates, a firm of architects, has three levels of professional staff: principals (managers), who manage all aspects of the architectural job; senior architects, who are responsible for the main designs; and junior architects, who provide technical support. Budgeted costs for five architectural jobs done over a recent period are as follows:

600 principal-hours at $105 per hour…….$63,000
18000 senior-hours at $75 per hour……135,000
3,600 junior-hours at $25 per hour……..90,000

Actual hours worked and the actual rates per hour to complete the five jobs are:

295 principal-hours at $108 per hour…….$31860
2360 senior-hours at $70 per hour……165,200
3245 junior-hours at $30 per hour……..97,350

REQUIRED

1. Calculate the total direct labor price and efficiency variances for the five jobs.
2. Calculate the total direct labor mix and yield variances for the five jobs.
3. Comment on your results in requirements 1 and 2.
4. How might managers use information about the direct labor yield and mix variances?