CHAPTER V: RELEVANT INFORMATION AND DECISION MAKING

Contents

5.0. Introduction
5.1. Learning Objectives
5.2. Relevant Costs and Decision Making Model
5.3. Common Relevant Cost Applications
5.3.1. Overview
5.3.2. Objectives
5.3.3. Marketing Decisions
5.3.4. Production Decisions
5.4. Summary
5.6. Answers for Learning Activity and Check Your Progress Questions
5.7 Glossary

5.0 INTRODUCTION

Making decision is choosing from alternatives. In this unit, several analytical techniques that aid managers in making a variety of business decisions are discussed. Your understanding of the previous units here determine the extent to which you comprehend the unit- "Relevant Information and Decision Making". It includes three sections. The first section explains the nature of "relevant" information. The steps in the decision making process are discussed in section two. The last section illustrates the application of the concept of relevant costs and benefits to various marketing and production decisions. Emphasis is also given to the relevance of opportunity costs and to the irrelevance of sunk costs.

5.1 LEARNING OBJECTIVES

Making correct decisions is one of the most important tasks of a successful manager. Every decision involves a choice between at least two alternatives. For instance, managers are constantly faced with problems of deciding what product to sell, what production method to

use, whether to make or buy component parts, what prices to charge, what channels of distribution to use, whether to accept special orders at special prices, and so forth.

After studying this unit you should be able to meet these learning objectives:

- explain the relevant costs for decision making purpose.
- describe and explain the decision making model
- apply the decision making concepts in a variety of business situations.

5.2. RELEVANT COSTS AND DECISION MAKING MODEL

5.2.0. Overview

Before the management of an enterprise can make an informed decision on any matter, they need to incorporate all of the relevant costs which apply to the specific decision at hand in their decision making process. To include any non-relevant costs or to exclude any relevant costs will result in management basing their decision on misleading information and ultimately to poor decisions being taken.

Therefore, management accountants have an important role in the decision-making process, not as an ultimate decision maker but as collectors and summarizers of relevant information.

5.2.1 Objectives

Upon completing this section, you should be able to:

- discriminate between relevant and irrelevant information for making decision.
- explain the relevance of opportunity costs and the irrelevance of sunk costs to decision making.
- explain the significance quantitative and qualitative factors in decision making.
- describe the short run decision making model

5.2.2. Relevant Costs Defined

What makes information relevant to a decision problem? Relevance is one of the key characteristics of good management accounting information. This means that management accounting information produced for each manager must relate to the decisions which he/she will have to make.

Relevant information includes the predicted future costs and revenues that differ among the alternatives. Any cost or benefit that does not differ between alternatives is irrelevant and can be ignored in a decision. All future revenues and/or costs that do not differ between the alternatives are irrelevant.

In brief, there are two criteria that qualify information to be relevant for decision making.

i. **Bearing on the Future:** To be relevant to a decision, cost or benefit information must involve a future event. Relevant information is a prediction of the future, not a summary of the past. Historical (past) data have no bearing on a decision. Such data can have an indirect bearing on a decision because they may help in predicting the future. But past figures, in themselves, are irrelevant to the decision itself. Why? Because decision-making affect future, but not past. Nothing can alter what has already happened.

ii) Different under Competing Alternatives: Relevant information must involve future costs or benefits that differ among the alternatives. These are called **differential revenues and costs**. In cost and management accounting, the term differential cost is synonymous with avoidable cost and relevant cost. Costs or benefits that are the same across all the available alternatives have no bearing on the decision. For example, if management is evaluating the purchase of either a manual or an automated drill press, both of which require skilled labor costing Br. 10 per hour, the labor rate is not relevant because it is the same for both alternatives.

Sunk Costs and Opportunity Costs

The emphasis on differential revenues and costs gives rise to two other, related concepts that you may have already encountered in your study of economics: *sunk costs and opportunity costs*. A **sunk cost** is one that has already been incurred and therefore will be the same no matter which alternative a manger selects. Sunk costs are never relevant for decision making because they are not differential.

Suppose a company has spent Br.500, 000 developing a new product. Problems have risen and the managers must now decide whether or not to market it. The Br.500, 000 is irrelevant to the decision because it is not differential; that is, the cost will be the same whether or not the firm markets the product. Similarly, depreciation on a machine is irrelevant in decision which products to make with that machine. All historical costs, whether original cost or book value (cost minus accumulated depreciation), are sunk costs.

Opportunity costs play a vital role in a decision making. An opportunity cost is the benefit lost by taking one action as opposed to another. The "other" action is the best alternative available other than the one being contemplated.

Suppose Beza Company owns a warehouse and can either use it to store products or rent it to another company for Br.8, 000 per year. Using the space for storage requires that Beza forego the opportunity to rent it, which means that there is a difference to Beza if it chooses to take one action rather than another. When Beza considers any action that requires using the space for storage, the relevant cost of the space is its opportunity cost, the Br.8, 000 rent Beza will not collect.

5.2.3. Model for Decision Making

How does a company go about making good tactical decisions? The six steps in decision-making process are as follows:

1. Define the problem.
2. Identify alternatives as possible solutions to the problem; eliminate alternatives that are not feasible.
3. Identify the relevant costs and benefits associated with each feasible alternative; eliminate irrelevant costs and benefits from consideration.
4. Total the relevant costs and benefits for each alternative.
5. Assess qualitative factors.
6. Select the alternative with the greatest overall benefit (make the decision)

These six steps define a simple decision model. A decision model is a set of procedures, if followed, will lead to a decision. The paragraph that follows discusses the sequence of steps to be followed.

Define the problem. The first step in decision-making process is to recognize and define a specific problem. This is the most important stage because all other activities in the process depend on it. If one does not have a clear understanding of the specific problem, he/she may spend valuable time and energy in identify alternatives and gathering probably irrelevant data. Moreover, incorrectly defined problems waste time and resources. That is why it is usually said that defining a problem is solving 50 percent of the problem.

Identify the Alternatives. Decision- making is selecting between two or more alternatives. This step is concerned with listing and considering of possible solutions. If a machine breakdown, what are the alternative courses of action? The machine can be repaid or replaced, or a replacement can be leased. But perhaps repair will turn out to be more costly than replacement. Determining the possible

alternatives is a critical step in the decision process. As part of this step, the company eliminates alternatives that are not feasible.

Identify relevant information Here, the costs and benefits associated with each feasible alternative are identified. At this step, clearly irrelevant costs can be eliminated from the consideration. The management accountant is responsible for gathering necessary data.

Total relevant costs and benefits This step involves determining the relevant costs and benefits of the possible alternatives.

Assess qualitative factors. Decision making is based on an evaluation of quantitative and qualitative factors. Typically, the quantitative factors are those for which measurement is easy and precise. In addition to this financial criterion, there are other factors that bear upon the decision and that are usually referred to as qualitative. Qualitative factors are simply those factors that are hard to put a number on. Put differently, qualitative aspects are those for which measurement in birrs and cents is difficult and imprecise

Qualitative factors can significantly affect the manager's decision. For example in make-or –buy decision, the quality of the product purchased externally, the reliability of supply sources, the expected stability of price over the next years, labor relations, community image and so on. Therefore, qualitative factors must be taken into consideration in the final step of the decision making model.

Make the decision. Once all relevant costs and benefits for each alternative have been assessed, the qualitative factors weighed, a decision can be made.

Learning Activity I

1. “All future costs are relevant in decision making.” Do you agree? Why?

5.3. COMMON RELEVANT COST APPLICATIONS

5.3.0. Overview

Many of the decisions described in this unit are involved with two or more courses of action from which the decision maker must select the best alternative. The analyses of these alternative choice decisions are aided by relevant cost and benefit data.

Therefore, the concept of relevant costs and benefits is applied here for various types of marketing and production decisions. Does this mean that each decision requires a different approach to identifying relevant costs? No. The fundamental principle in all decision situations is that relevant costs are future costs that differ among alternatives. The principle is simple, but its application is not always straightforward.

5.3.1. Objectives

Upon completing this section, you should be able to:

- Analyze data by the contribution approach to support a decision for accepting or rejecting special sales order.
- Analyze data by the relevant information approach to support a decision for keep-or-drop a product line or other segments of a company.
- Measure product profitability when production is constrained by a scarce resource.
- identify qualitative and quantitative factors to be considered in a make-or-buy decisions
- prepare an analysis to support a decision to make or buy certain parts or products.

- prepare an analysis showing joint products should be sold at the split-off point or process further.
- identify sunk costs and explain why they are not relevant in decision whether to keep or replace equipment.

5.3.2. Marketing Decisions

Special-Order Decisions

A special order is a one-time order that is not considered part of the company's normal on going business. For example, a discount department store chain planning a big sale offers to make a large one-time purchase of a firm's product but wants a reduced price. In general, a special order is profitable as long as the incremental revenue from the special order exceeds the incremental costs of the order. The incremental revenue in this decision will be the price per unit offered by the potential customer times the number of units to be purchased. The incremental costs will be the amount of the expected cost increase if the offer is accepted. The incremental cost usually includes variable manufacturing costs of producing the units. Since the units being sold in the special order are not being sold through the firm normal distribution channel, the firm may or may not incur variable selling and administrative expenses in conjunction with the special order.

The incremental costs usually do not include fixed manufacturing costs. Although the fixed costs must be incurred to permit production, the amount of fixed costs incurred by the firm usually will not increase if the special order offer is accepted. For the same reason, other fixed expenses, such as fixed selling and administrative expenses, are usually not relevant in the special order price.

However, management must also be assured that it has sufficient capacity to produce the special order without affecting normal sales.

When there is no excess capacity, the opportunity cost of using the firm's facilities for the special order are also relevant to the decision. The opportunity cost would be the contribution margin forgone on regular sales that have to be reduced to accommodate the special order. The relevant costs to accept the special order, therefore, would include a forgone contribution margin on regular sales that could not be made in addition to the incremental costs associated with the special order that have already been discussed.

Example 1. Kora's manufacturing plant has the capacity to produce 15,000 units each month. The factory is currently operating at 70% production level to meet the monthly demand. The company normally charges Br. 130 per unit using a 30% markup on manufacturing costs. Cost information for the current activity level is as follows:

Direct materials	Br. 756,000
Direct labor	189.000
Variable manufacturing overhead(MOH)	21,000
Fixed manufacturing overhead	105,000
Total manufacturing costs	**Br.1,050,000**

Additional expenses include a Br. 10 variable selling and administrative expenses and fixed selling and administrative expenses of Br. 2.50 per unit. Currently, the company had an opportunity to sell all its produce at Br. 130. Management, however, would like to use the excess capacity to accept the special order.

No additional fixed manufacturing costs or selling and administrative expenses will be incurred to permit production of the 4, 000 units special order.

Because these units are being sold directly to the chain store, variable selling and administrative expenses are expected to be only Br. 2.50 per unit on the special order.

Instructions:

a. Would it be profitable for Kora Company to accept this special order at Br.100? Why?

b. Refer all the facts presented above. However, assume that the special order was for 6, 000 units instead of 4, 000 units. The conditions of the special order specify that it has to be accepted in full as acceptance of partially quantity is not allowed. To accept this special order Kora Company must cut back normal sales because production capacity can not be expanded in the short run. Should the special order be accepted or rejected? Why?

c. Refer requirement (b) above. At what selling price per unit would the company be indifferent between accepting and rejecting the offer?

There are two approaches to costs on income statement: absorption/financial approach and contribution approach.

An absorption approach is a costing technique that considers all factory overheads (both variable and fixed) to be product costs that become an expense in the form of manufacturing cost of goods sold as sales occur.

A contribution approach is a method of internal reporting (management accounting) that emphasizes the distinction between variable and fixed costs for the purpose of better decision.

Financial Approach		**Contribution Approach**	
Sales	xxx	Sales	Xxx
Cost of goods sold	xxx	Variable costs	Xxx
Gross profit	xxx	Contribution margin	Xxx
Selling and Admin. Expenses	xxx	Fixed costs	Xxx
Operating income	xxx	Operating income	Xxx

The correct analysis to the above problem employs the contribution approach to income statement, not the financial approach. The fallacy in the case of the later approach is that it treats a fixed cost, i.e., fixed manufacturing cost as if it were variable.

Solution

a. At first glance, it appears unprofitable for Kora to accept the special order. Not only is the sales price of Br.100 per unit much less than the regular sales price, it is even less than Kora's Br.102 average per-unit cost of manufacturing the product. Let us look, however, at the incremental monthly revenue and manufacturing costs that should result from accepting this special order.

	Without special order 10, 500units	**Effect of special order 4,000 units**	**With special order 14, 500 units**
Sales	Br. 1,365,000	Br. 400,000	Br. 1,765, 000
Variable expenses			
Direct material	Br. 756, 000	Br. 288, 000	Br. 1, 044,000
Direct labor	189, 000	72, 000	261, 000
MOH	21, 000	8,0 00	29, 000
Selling & Administrative	105, 000	10, 000	115, 000
Total variable expenses	Br. 1,071,000	Br. 378, 000	Br. 1, 449, 000
Contribution Margin	Br. 294,000	Br. 22, 000	Br. 316, 000
Fixed expenses			

Manufacturing overhead	Br. 105,000	-	Br. 105, 000
Selling and admin.	26,250	-	26, 250
Total fixed expenses	131, 250	-	Br. 131, 250
Operating income	**Br. 162, 750**	**Br. 22, 000**	**Br. 184, 750**

This analysis shows that accepting the special order will generate incremental revenue of Br.400, 000, and incremental costs of only Br.378, 000. Therefore, accepting the special order will increase Kora's monthly profit by Br.22, 000.

The relevant factors in this type of decision are the incremental revenue that will be earned and the additional (incremental costs) that will be incurred by accepting the special order. The only incremental costs of filling the special order are the related variable manufacturing costs; accepting the order will not increase fixed manufacturing costs. Thus, the Br.102"average manufacturing cost," which includes fixed costs per unit, is not entirely relevant to the decision.

Recommendation: The accountant's role in decision-making is primarily that of a technical expert on cost analysis, i.e., collecting and reporting relevant information. However, many managers want the accountant to recommend the proper decision; the final choice always rests with the operating executives.

Based on the relevant data, Kora Company should accept the special order because it brings an additional income of Br. 22,000 for company.

Income with special order	Br. 184, 750
Income without special order	162, 750
Additional income if the order had	**Br. 22,000**

been accepted

b. In evaluating the merits of a special order, managers should consider the effect that filling the order might have upon the company's regular sales volume and sales prices.

In this requirement, the company has **no sufficient capacity** to produce the special order without affecting normal sales. To accept the special order for 6, 000 units Kora Company must cut back normal sales by 1, 500 units because production capacity can not be expanded in the short run Therefore, the relevant costs to be used in evaluating the special order include an opportunity cost. The opportunity cost is the contribution margin forgone on regular sales. The net relevant costs to accept the special order would now be the total of Br. 567,000 variable costs and a forgone contribution margin of Br. 42,000.

The total cost of accepting the special order, Br. 609,000, exceeds the offered selling price of Br. 600,000.

Incremental revenue		Br. 600,000
Incremental cost		
Variable costs	Br. 567,000	
Opportunity costs	42,000	609, 000
Disadvantage in favor of accepting the special order		**(Br.9, 000)**

Kora Company should not accept the special order because it has a net Br. 8,000 disadvantage. The above analysis may be presented as tabulated here below:

	A **Without**	**B**	**C**	**(A-B)+C** **With**

	special order 10, 500units	**Effect of special order on Regular Sale 1,500 units**	**Effect of special order 6,000 units**	**special order 14, 500 units**
Sales	Br. 1,365,000	Br.195, 000	Br. 600,000	Br. 1,770, 000
Variable expenses				
Direct material	Br. 756, 000	Br.108, 000	Br. 432, 000	Br. 1, 080,000
Direct labor	189, 000	27, 000	108, 000	270,0 00
MOH	21, 000	3, 000	12,0 00	30, 000
Selling & Admin.	105, 000	15, 000	15, 000	105, 000
Total variable exp.	Br. 1,071,000	Br.153, 000	Br. 567, 000	Br. 1, 485, 000
Contribution Margin	Br. 294,000	Br.42, 000	Br. 33, 000	Br. 285, 000
Fixed expenses				
MOH	Br. 105,000	-	-	Br. 105, 000
Selling and admin.	26,250	-	-	26, 250
Total fixed expenses	131, 250	-	-	Br. 131, 250
Operating income	**Br. 162, 750**	**Br.42, 000**	**Br. 33, 000**	**Br. 153, 750**

Income with special order = Br.

	153,750	
Income without special order		=
	162,750	
Disadvantage of accepting the special order	=	**Br. (9,000)**

c. Under the condition given in (b), the company will be economically indifferent between accepting and rejecting the special sales order if the contribution to profit from the special order equals a contribution margin forgone from regular sales. Therefore, the offer "p" will make Kora Company equally attractive between these two alternatives

P (6,000) – 6,000 (94.5) = 42,000

P (6,000) = 42,000 + 567, 000

P (6,000) = 609,000

$P = \frac{609{,}000}{6{,}000}$

P = **Br. 101.5**

Keep-or-Drop Decisions

Often a manager needs to determine whether or not a segment or other segments of a company should be kept or dropped. Segment report prepared on a variable-costing basis provides valuable information for these keep-or-drop decisions. However, while segmented reports provide useful information for such decisions, relevant costing describes how the information should be used.

In keep-or-drop decisions, many factors must be considered that are both qualitative and quantitative in nature. Ultimately, however, any final decision to drop an old segment or to add a new one is going to hinge primarily on the impact the decision will have on net operating income. To assess this impact, it is necessary to make a careful

analysis of the costs involved. To this end, let us try to distinguish the difference between avoidable and unavoidable fixed expenses.

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. Examples of avoidable costs include departmental salaries and other costs that could be avoided by not operating the specific department.
- **Unavoidable costs** are costs that continue even if a subunit or an activity is eliminated and are not relevant for decision. The reason for this is that such costs are not affected by a decision to delete a particular activity. Unavoidable costs include many common costs, which are defined as those costs of facilities and services that are shared by users. Examples are store depreciation, heating, air conditioning, and general management expenses.

Example 1. Brass Ltd. manufactures three products, X, Y and Z. The present net annual income from each item is as follows:

	X	**Y**	**Z**	**Total**
Sales	Br. 50,000	Br.40,000	Br.60,000	Br.150,000
Variable Costs	30,000	25,000	35,000	90,000
Contribution margin	20,000	15,000	25,000	60,000
Fixed Costs	7,000	18,000	20,000	55,000

Profit(Loss)	**Br. 3,000**	**Br(3,000)**	**Br.5,000**	**Br.5,000**

Brass Ltd. is concerned about its poor profit performance, and is considering whether or not to cease selling Product Y. It is felt that selling prices cannot be increased or lowered without adversely affecting net income. Br.5, 000 of the fixed costs of Product Y is direct fixed costs which would be saved if production ceased. All other fixed costs will remain the same.

Instructions:

a. Advise Brass Ltd. whether or not to cease production of Product Y. Assume that the total assets would be unaffected by the decision and the resources made available by dropping Product Y would remain idle.
b. Suppose, however, it were possible to use the resources realized by stopping production of Product Y, and switch to produce a new item, Product W, which would sell for Br.50,000 and incur variable costs of Br.30,000 and extra fixed costs of Br.6,000. What will the new decision be?

Solutions:

a. Here, in this requirement, it appears that Brass Company will improve its overall profits if it drops Product Y. However, in order to make the **correct decision** regarding dropping a product line, we need to compare lost contribution margin with avoidable fixed costs. If the avoidable fixed costs are greater than lost contribution margin then Brass Company is better off dropping Product Y.

	A Total before change	**B Effect of dropping Product Y**	**A– B Total after change**
Sales	Br.150,000	Br.40,000	Br.110,000
Variable Costs	90,000	25,000	65,000
Contribution margin	60,000	15,000	45,000
Fixed expenses	55,000	5,000	50,000
Profit (loss)	**Br.5,000**	**Br(10,000)**	**Br. (5,000)**

Dropping Product Y reduces total sales by Br.40, 000. Similarly, total variable expenses are reduced by Br.25, 000. Thus, the total contribution margin is reduced by Br.15, 000. Moreover, in analyzing the fixed costs of Product Y, we find that Br.13, 000 of the total fixed costs of Br.18, 000 are not avoidable, that is, they will continue even if Product Y is dropped. Only Br.5, 000 of the fixed costs are avoidable. When we compare the avoidable fixed costs of Br.5, 000 with the loss contribution margin of Br.15, 000, we see that total net profits will decrease by Br.10, 000 if Product Y is dropped.

Income with Product Y	=	Br. 5,000
Net loss assuming Product Y is dropped	=	(5,000)
Disadvantage of Dropping Product Y	=	**Br. (10,000)**

To sum up, assuming only the two alternatives, keep Product Y or drop it, keeping it will be the best choice because dropping it would reduce income by Br.10, 000.

b. The conclusion in requirement (a) above will be correct if and only if the resources made available by dropping Product Y would be idle. Nevertheless, dropping Product Y and using the resources realized by stopping production of Product Y to produce a new item, Product W is recommendable. The Br. 14,000 addition to profits from Product W more than offset the Br. 10,000 decline from eliminating Product Y, providing an overall increase in profit of Br. 4,000.

	A Total before change	**B** Effect of dropping Product Y	**C** Effect of adding Product W	**(A– B) +C** Total after change
Sales	Br.150,000	Br.40,000	Br.50,000	Br.160,000
Variable Costs	90,000	25,000	30,000	95,000
Contribution margin	60,000	15,000	20,000	65,000
Fixed expenses	55,000	5,000	6,000	56,000
Profit (loss)	**Br.5,000**	**Br(10,000)**	**Br.14,000**	**Br.9,000**

Income assuming Product Y is dropped and W is added	=	Br.9,000
Income before change	=	5,000
Advantage of Dropping Product Y & Adding Product W	=	**Br. 4,000**

Example 2. Addis Supermarket has two departments; namely, D 01 and D 02. Management is concerned about the continued losses shown by D 01 and wants a recommendation as to whether or not this department should be discontinued. The predicted income statement for Addis Supermarket is given below:

	D 01	**D 02**	**Total**
Sales	Br.100,	Br.60,	Br.160, 000

	000		000		
Variable		80,		24,	104, 000
expenses	000		000		
Contribution		20,		36,	56, 000
Margin	000		000		
Fixed Expenses		32,		12,	44, 000
	000		000		
Income (Loss)	**Br.**	**(12,**	**Br.**	**24,**	**Br. 12, 000**
	000)		**000**		

A study indicates that Br.15, 000 of the fixed expenses for D 01 will be avoided if the department is dropped. Furthermore, the manger will use the vacated space for expansion of D 02 if the other department is discontinued. The expansion of D 02 would result in a 25% increase in the sales of the department with 60% contribution margin. In addition the expansion requires additional avoidable fixed costs of Br.3000.

Instruction: Would you recommend that D 01 be dropped? Why or why not?

Solution

Of course, a company considering dropping a segment often has other alternatives. If Addis Supermarket drops D 01, the company probably could use the freed-up space in some other way, such as to expand the other department, add another one, or even to rent the idle facility to another company.

Addis Supermarket is considering finding the best way to use existing resources. These two alternatives under consideration are to keep D

01 or discontinue D01 and expand D 02. Dropping department D 01 would reduce profits by Br.5, 000 and the expansion of D 02 would boost income by Br.6, 000. Therefore, dropping D01 and expanding D 02 increases the overall profit of the company by Br.1, 000.

	A Total before Change	**B Effect of dropping D 01**	**C Effect of expanding D 02**	**(A-B) +C Total after Change**
Sales	Br.160, 000	Br.100, 000	Br.15, 000	Br.75, 000
Variable expenses	104, 000	80, 000	6, 000	30, 000
Contribution Margin	56, 000	20, 000	9, 000	45, 000
Fixed Expenses	44, 000	15, 000	3, 000	32, 000
Income (Loss)	**Br. 12, 000**	**Br.5,0 00**	**Br.6 ,000**	**Br.13, 000**

Optimal Use of Limited Resources

Managers are routinely faced with the problem of deciding how scarce resources are going to be utilized. A **scarce resource** or a **limiting factor** refers to any factor that restrict or constraint the production or sale of a product or service. It include the following, among others, labor hours, machine hours, square feet of floor space, cubic meters of display space .A department store, for example, has a limited amount of floor space and therefore cannot stock every product that may be available. A manufacturing firm has a limited number of machine-hours and a limited number of direct labor-hours at its disposal. When

capacity becomes pressed because of scarce resource, the firm is said to have a constraint.

When a plant that makes more than one product is operating at capacity, managers often must decide which orders to accept. The contribution margin technique also applies here, because the product to be emphasized or the order to be accepted is the one that makes the biggest total profit contribution per unit of the limiting factor. Fixed cost are usually unaffected by such choices.

In such kind of decision, the contribution margin technique must be used wisely. Managers sometimes mistakenly favor those products with the biggest contribution margin or gross margin per sales birr, without regard to scarce resources.

Example (1): Temaru Company has two products: a plain cellular phone and a fancier cellular phone with many special features. Unit data follow:

	Plain Phone	Fancy Phone
Selling price	Br.80	Br.120
Variable costs	64	84
Contribution margin	Br.16	Br.36
Contribution margin ratio	20%	30%

Instructions:

a. Which product is more profitable? On which should the firm spend its resources? Assume that sales are restricted by demand for only a limited number of phones.
b. Now suppose that annual demand for phones of both types is more than the company can produce in the next year and the major constraint is the availability of time on a processing machine. Plain Phone requires one hour of processing on the machine, Fancy Phone requires three hours of processing.

Which product is more profitable? Assume that only 10, 000 machine hours of capacity are available.

Solution:

a. Under this circumstance, the limiting factor is units of sale. Thus, the more profitable product is the one with the higher contribution margin per unit. The fancier cellular phone appears to be more profitable than the plain phone. It has Br.36 per unit contribution margin as compared to Br.16 per unit for the plain model, and it has a 30% CM ratio as compared to 20% for the plain model.

To maximize total contribution margin, a firm should not necessarily promote those products that have the highest contribution margins. Rather, total contribution margin will be maximized by promoting those products or accepting those that provide the highest unit contribution margin in relation to scarce resources of the firm.

b. Here, the productive capacity is the limiting factor because only 10, 000hours of capacity is available. To answer this question, the manager should look at the contribution per unit of the scarce resource. This figure is computed by dividing the contribution margin for a unit of product by the amount of the scarce resource it requires. These calculations are carried out below for the plain and fancy phones.

	Model	
	Plain Phone	**Fancy Phone**
Contribution margin (CM) per unit (a)	Br.16	Br.36
Machine hours required per unit (b)	1 hour	3 hours
CM per limiting factor (a÷b)	Br.16per MHR*	Br. 12 per MHR

MHR* =machine hour

With this data in hand, it is easy to decide which product is less profitable and should be de-emphasized. Each hours of processing time on the machine that is devoted to the plain phone results in an increase of Br.16 in contribution margin and profits. The comparable figure for the fancier phone is only Br.12 per hour. Therefore, the plain model should be emphasized in this situation. Even though the fancier model has the larger per unit contribution margin and the larger CM ratio, the plain model provides the larger contribution margin in relation to scarce resource.

5.3.3. Production Decisions

Make-or-Buy Decisions

Most manufactured products consist of several components that are assembled into finished unit. Many of these components can be bought from an outside supplier or made by the assembling firm. For each of these components, the firm's managers must decide: make or buy. The make-or-buy decision is the act of making a choice between producing an item internally (in-house) or buying it externally (from an outside supplier). The buy side of the decision also is referred to as outsourcing. Make-or-buy decisions usually arise when a firm that has developed a product or part-or significantly modified a product or part-is having trouble with current suppliers, or has diminishing capacity or changing demand.

In make or buy decisions, the appropriate means of analysis is to compare the relevant cost of buying the part with the relevant cots of making the part. Here relevant cost of buying the component is typically the amount paid to supplier. It may also include transportation costs incurred to get the component to the company's plant and costs incurred to process the part upon receipt.

The relevant cost of making the component is often the variable costs incurred to produce the component. In some cases, however, the company will need to acquire special equipment to produce the product or will hire additional supervisory personnel to assist with making the product. These incremental fixed costs will be part of the relevant cost of making the part. The alternative chosen make or buy, is typically the one with the lowest cost.

Factors that may influence firms to make a part in-house include:

- Cost considerations (less expensive to make the part)
- Desire to integrate plant operations

- Productive use of excess plant capacity to help absorb fixed overhead (using existing idle capacity)
- Need to exert direct control over production and/or quality
- Better quality control
- Design secrecy is required to protect proprietary technology
- Unreliable suppliers
- No competent suppliers
- Desire to maintain a stable workforce (in periods of declining sales)
- Quantity too small to interest a supplier
- Control of lead time, transportation, and warehousing costs
- Greater assurance of continual supply
- Provision of a second source
- Political, social or environmental reasons (union pressure)
- Emotion (e.g., pride)

Factors that may influence firms to buy a part externally include:

- Lack of expertise
- Suppliers' research and specialized know-how exceeds that of the buyer
- cost considerations (less expensive to buy the item)
- Small-volume requirements
- Limited production facilities or insufficient capacity
- Desire to maintain a multiple-source policy
- Indirect managerial control considerations
- Procurement and inventory considerations
- Brand preference
- Item not essential to the firm's strategy

The two most important factors to consider in a make-or-buy decision are cost and the availability of production capacity. Cost considerations should include all relevant costs. Obviously, the buying firm will compare production and purchase costs. Elements of the "make" analysis include:

- Incremental inventory-carrying costs
- Direct labor costs
- Incremental factory overhead costs
- Delivered purchased material costs
- Incremental managerial costs
- Any follow-on costs stemming from quality and related problems
- Incremental purchasing costs
- Incremental capital costs

Cost considerations for the "buy" analysis include:

- Purchase price of the part
- Transportation costs
- Receiving and inspection costs
- Incremental purchasing costs
- Any follow-on costs related to quality or service

Example 1. Assume that a division of Dream Company makes an electric component for its speakers. The management is trying to decide whether the division of the company should manufacture this component part or purchase it from another manufacturer.

The following are production costs for 100,000 units of the component for the forth-coming year.

Direct material		Br.500,000
Direct labor		200,000
Factory overhead		
Indirect labor	Br. 32,000	
Supplies	90,000	
Allocated occupancy costs	50,000	172,000

Total cost	**Br.872, 000**

A small local company has offered to supply the components at a price of Br.8.20 each. If the division discontinued the production of its components it would save two thirds of the supplies cost and Br.22, 000 of indirect labor cost. All other overhead costs would continue regardless of the decision made.

Instruction:

a. Should the parts be made or bought? Assume that the capacity now used to make the parts will become idle if they are purchased from outside.
b. Suppose Ethio may decide to rent the facility it devotes to making the part to a nearby manufacturer for Br. 45, 000 annually, could this change your answer to part (a)? Why?

Solution:

a. In this case Br.10, 000 of indirect labor cost and the Br.50, 000 allocated occupancy costs are unavoidable costs. That is, a total of Br. 60,000 fixed overhead costs cannot be eliminated irrespective of the decision made. Therefore, these costs are irrelevant for the decision making at hand. The relevant costs can be computed as follows.

	Cost to Make		**Cost to Buy**	
	Unit	**Total**	**Unit**	**Total**
Direct material	Br. 5.00	Br. 500,000		
Direct labor	2.00	200,000		
Factory overhead				
Indirect labor	0.22	22,000		
Supplies	0.60	60,000		
Occupancy	-	-		

costs

Total cost	**Br. 7.82**	**Br.782, 000**	**Br. 8.20**	**Br.820, 000**

Dream Company should make the component internally because the firm saves Br. 38,000 by purchasing the component.

b. If

Net relevant cost to buy	Br. 820,000
Net relevant cost to make	782,000
Advantage in favor of make	**Br. 38,000**

the space now being used to

produce the part would otherwise be idle, then Dream Company should continue to produce its own component part and the supplier's offer should be rejected, as stated above. Idle space that has no alternative use has an opportunity cost of zero.

But what if the space now being used to produce the part would **not sit idle** rather could be used for some other purpose? In that case, the space would have an opportunity cost that would have to be considered in assessing the desirability of the supplier's offer. What would this opportunity cost be? It would be the segment margin that could be derived from the best alternative use of the space. Therefore, the use of the idle facilities may change our previous decision.

Assuming the space now being used to produce part would be rented to a nearby manufacture for Br. 45, 000 per annum. The analysis will take the following form.

	Make	**Buy and Leave Facility Idle**	**Buy and Rent out**
Cost to obtain parts	Br.	Br. 820, 000	Br.820,

	782,000		000
Contribution from other products	-	-	
Rent revenue	-	-	(45, 000)
Net relevant costs	**Br. 782, 000**	**Br. 820, 000**	**Br.775, 000**

Dream Company would be better off through accepting the supplier's offer and to using the rent the available facility to a near by manufacturer. This move has the least net relevant cost of Br.775, 000.

Example 2. Ethio Company currently produces the 12, 500 units of part TM # 02 that is used each year to make its product. Management is considering the possibility of purchasing this component part from another manufacturer. Ethio's accountants have provided the following estimate of per unit cost based on 12, 500 units to manufacture TM # 02.

Direct Material	Br .7
Direct labor	2
Variable manufacturing overhead	6
Fixed manufacturing overhead	5
Total manufacturing cost	Br. 20

Lucy Company has offered to supply the part for Br. 18. If Ethio Company accepts the offer, it will be able to use the facilities it devotes to making the part to manufacture another product that would be sold

for Br. 80,000 per annum with contribution margin of 25% of sales. And it will also be able to reduce its fixed overhead costs to Br. 37,500.

Instructions:

a. Based on relevant data, should Ethio management make or buy the 12, 500 units of TM # 02?
b. Assuming the Br. 18 price form Lucy Company, at what annual unit volumes will Ethio is economically indifferent between making and buying the part?
c. Instead of producing other product, Ethio may decide to rent the facility it devotes to making the part to a nearby manufacturer for Br. 40, 000 annually, could this change your answer to part (a)? Why?

Solution

a. To approach the decision from a financial point of view, the manager must focus on the relevant or differential 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 that will continue regardless of whether the parts TM # 02 are produced internally or purchased from outside.

Thus, the relevant cost computation follows:

	Cost to Make	
	Unit	**Total**
Direct material	Br.7	Br.87, 500
Direct labor	2	25, 000
Variable factory overhead	6	75, 000
Fixed factory overhead (OH)	2	25, 000*
	Br.17	**Br.212, 500**

*Avoidable fixed OH= (12, 500 X Br.5)-Br.37, 500=Br25, 000

Here above, the analysis shows that the variable costs of producing the part TM # 02 (materials, labor, and variable overhead) are differential

costs. All these variable costs, therefore, can be avoided or eliminated by buying the part from the outside supplier.

Again, are only the variable costs relevant? No. Perhaps Br. 25, 000 of the total fixed factory overhead cost is avoidable, and then it too will be a differential cost and relevant to the decision. Therefore, the decision should be made by comparing the total of all variable costs and the avoidable fixed factory overhead against the net relevant cost to buy.

Computation of net relevant costs to buy

Purchase price=12, 500 x Br.18	=	Br.225, 000
Less: Contribution from other products=Br.80, 000 x 0.25	=	20, 000
Net relevant costs		Br.**205, 000**

Cost to make	Br.212, 500
Cost to buy	205, 000
Advantage in favor of buy	**Br.7, 500**

b. Cost functions

Cost to make = (7+2+6) Q + 25, 000

=15Q + 25, 000

Cost to buy =18Q-20, 000

Let "Q units" be annual production with in the relevant range that Ethio is economically indifferent between making and buying the part assuming the Br.18 offer from Lucy Company. Thus, 15Q + 25, 000 =18Q-20, 000

3Q=45, 000

Q=**15, 000 units**

c. Our decision in part (a) above will not change unless the alternative use of the idle facility falls below Br.12, 500, i.e., Br.225, 000 less Br.212, 500.

Computation of net relevant costs to buy

Purchase price=12, 500 x Br.18	=	Br.225, 000
Less: Rental income	=	40, 000
Net relevant costs		Br.**185, 000**

Cost to make	Br.212, 500
Cost to buy	185, 000
Advantage in favor of buy	**Br.27, 500**

Sell or Process Further Decisions

In some manufacturing processes, several intermediate products are produced from a single input. Such products are known as joint products if they have relatively significant sales values and are not separately identifiable as individual products until their split off. The process that makes the joint products is called a **joint process**. The costs associated with making these products up to the point where they can be recognized as separate products (the split-off point) are called joint product costs.

Manufacturers of joint products must decide to sell them at the split-off point or process them further into another saleable product. It is profitable to continue processing a joint product after the split-off point so long as the incremental revenue from such processing exceeds the incremental processing costs (separable costs). In such decisions, the joint product costs incurred before the split-off point are irrelevant and should be ignored. The joint product costs have already been incurred and therefore are sunk costs. However, allocation of joint product costs is need for some purposes, such as balance sheet inventory valuation. In case joint products are on hand at the end of an accounting period, some value must be assigned to them. To do so,

joint product costs must be allocated to specific units of inventory. In addition, joint costs are also important for income determination.

Learning Activity II

1. What information is needed for the sell or process further decision? Explain
2. Should joint costs be considered in a sell-or-process further decision? Explain
3. Suppose that a product can be sold at split-off for Br.5, 000 or processed further at a cost Br.1, 000 and then sold for Br.6, 400. Should the product be processed further?

Example 1. Hibret Company uses a common direct material, RM-01, to produce three joint products. The cost of processing the single material up to the split off point amounts to Br.8, 000. The following cost and revenue data pertain to the joint products at the split off point

Joint Product	**Sales price per unit**	**Output produced**
X	Br.1.20	2, 500 units
Y	2.00	2, 000
Z	1.50	3, 000

The joint products can be sold at the split off point or after further processing. Assume no loss of input in further processing. The following information provides the incremental revenue per unit and the separable cost (on a total basis) for each product if they were processed further.

Product	**Sales price per unit**	**Separable cost**
X	Br.2.00	Br.1, 800
Y	3.25	2, 000
Z	2.00	1, 750

Instructions:

a. Currently, Hibret Company processes all the joint products further. How much would be the profit with this processing decision?
b. Which product should be sold at the split off and which should be processed further? How much would be the profit with this processing decision?

Solution:

a. Total Profit=Total Revenue-Total Cost

Because all joint products are sold at the split-off point, the profit from these products will be the difference between the sell at the split-off point and the joint cost.

Sales revenue at split- off

Product X = (2, 500 x Br. 1.20) = Br.3, 000

Product Y = (2, 000 x Br. 2.00) = 4, 000

Product Z = (3, 000 x Br. 1.50) = Br.11, 500

4, 500

Less:	Joint costs	8,000
	Profits	**Br. 3, 500**

b. As a general rule, it will always be profitable to continue processing a joint product after the split –off point so long as the incremental revenue from such processing exceeds the incremental costs. Therefore, it may not be profitable to Hibret Company to sell all the joint products at the split-off. Consider the analytical approaches below for each product.

Product X

Sales revenue after Further Process (2,500 x Br 2.00)	Br. 5, 000

Less: Sales value at split- off (2,500 x Br. 1.20)	3, 000
Incremental revenue	Br. 2, 000
Less: Separable (incremental) costs	1,800
Advantage of processing further	**Br. 200**

A differential analysis for Product X would show the Br.2, 000 additional revenue from selling after further processing and the additional costs of further processing Br.1, 800, giving Br.200 difference in favor of a decision to process the product beyond the split-off point. Another way to look at the decision is to say that the opportunity cost of processing further is the Br.3, 000 given up by not selling at split-off. Incorporating the opportunity cost into the analysis of the decision to process further gives total costs of Br.4, 800(Br.3, 000+Br.1, 800). Subtracting Br.4, 800 from Br.5, 000 revenue also gives the Br.200 advantage.

Product Y

Sales revenue after Further Process (2,000 x Br 3.25)	Br. 6, 500
Less: Sales value at split- off (2,000 x Br. 2.00)	4, 000
Incremental revenue	Br. 2, 500
Less: Separable (incremental) costs	2, 000
Advantage of processing further	**Br. 500**

Product Z

Sales revenue after Further Process (3,000 x Br 2.00)	Br. 6, 000
Less: Sales value at split- off (3,000 x Br. 1.50)	4, 500
Incremental revenue	Br. 1, 500
Less: Separable (incremental) costs	1,750

Disadvantage of processing further **(Br. 250)**

To summarize, Hibret Company's manager would correctly conclude that product X and Y should be processed into another saleable product. And Product Z, on the other hand, should be sold at the split-off because the firm would be Br.250 worse off if it processes further. The joint product cost of Br. 8,000 should not be used to reach this decision. Rather, the analysis should be limited to the difference between the incremental revenue and the incremental (separable) cost.

Profit of this better decision, i.e. to sell Product Z at split-off and further process the other two products will be

Profit = Total Revenue- Total Cost

=5, 000 + 6, 500 + 4, 500-(8, 000 + 1, 800 + 2, 000)

= Br.4, 200

Alternatively computed,

Profit = Profit in (a) above + Advantage in further processing Product X & Y

= Br.3, 500 + Br.700

= Br.4, 200

Keep or Replace Equipment Decisions

Care must be taken to select only the data that are relevant for a decision whether to replace or keep the old equipment. In such kind of decision, the book value of the old equipment is not a relevant consideration, for instance.

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

i. **Book value of old equipment:** Irrelevant, because it is a past (historical) Cost. Therefore, depreciation on old equipments 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.

Example 1. Consider these data regarding Success Company photocopying requirements:

	Old Equipment	**Proposed Replacement Equipment**
Useful life, in years	5	3
Current age, in years	2	0
Useful life remaining, in years	3	3
Original cost	Br. 25,000	Br. 15,000
Accumulated depreciation	10,000	0
Book value	15,000	Not acquired yet
Disposal value (in cash) now	3,000	Not acquired yet
Disposal value in 2 years	0	0
Annual cash operating costs for power, maintenance, toner and supplies	Br. 14,000	

The administrator is trying to decide whether to replace the old equipment. Because of rapid changes in technology, he expects the replacement equipment to have only a three-year useful life. Ignore the effects of taxes.

Instruction: Should Success keep or replace the old equipment? Compute the difference in total cost over the next 3-years under both alternatives that is, keeping the original or replacing it with the new machine.

Solution:

	THREE YEARS TAKEN TOGETHER	
	Old Equipment	**New Equipment**
Cost of new equipment	-	Br. 15,000
Disposal Value	-	(3,000)
Cash operating costs	Br. 42,000	22,500
Net relevant costs	**Br. 42,000**	**Br. 34,500**

Recommendation: Replacing the old equipment has a net Br. 7,500 advantage (Br.42, 000 less Br. 34,500)

Example (2) Awash Company has just today paid for and installed a special machine for polishing cars at one of its several outlets. It is the first day of the company's fiscal year.

The machine cost, Br. 20,000. Its annual cash operating costs total Br. 15,000, exclusive of depreciation. The machine will have a 4-year useful life and a zero terminal disposal price.

After the machine has been used for a day, a machine salesperson offers a different machine that promises to do the same job at a yearly cash operating cost of Br. 9,000, exclusive of depreciation. The new machine will cost Br. 24,000 cash, installed. The "old" machine is unique and can be sold outright for only Br. 10,000 minus Br. 2000

removal cost. The new machine, like the old one, will have a 4-year useful life and zero terminal disposal prices.

Sales, all in cash, will be Br. 150,000 annually, and other cash costs will be Br. 110,000 annually, regardless of this decision.

Instructions:

a. Prepare a summary income statement covering the next four years under both alternatives (when the new machine is not purchased and when the new machine is purchased). What is the cumulative difference in operating income for the 4 years taken together?
b. Determine the desirability of purchasing the new machine using only relevant costs in your analysis?

Solutions:

Two different approaches may be used to solve such kinds of problems for decision-making purposes.

i. **Comparative income approach.** This approach includes both relevant and irrelevant costs. When the comparative income approach is used, the net operating income for each alternative is computed and compared. All revenues and costs are considered-even those that are the same for each alternative.
ii. **Differential analysis.** In this approach, only revenues and costs that differ among the alternatives are considered.

N.B. The end-result- a correct decision - will be the same regardless of which method is used.

Method I. Comparative income approach.

Awash Company Comparative Income Statement For the Next 4 years together		
	Old Machine	**New Machine**
Sales	Br. 600,000	Br. 600,000

Cash operating costs	(60,000)	(36,000)
Other cash costs	(440,000)	(440,000)
Depreciation	(20,000)	(24,000)
Loss on disposal		(12,000)
Income	**Br. 80,000**	**Br. 88,000**

Comment: The above analysis (which includes both relevant and irrelevant items) shows Br. 8000 cumulative difference in operating income for the 4 years taken together. Ignoring income taxes and the time value of money, the purchase of the new machine appears to be a favorable.

Method II. Differential analysis

	FOUR YEARS TAKEN TOGETHER	
	Old machine	**New machine**
Cost of new equipment	-	Br. 24,000
Disposal value	-	(8,000)
Cash operating costs	Br. 60,000	36,000
Net relevant costs	**Br. 60,000**	**Br. 52,000**

When differential analysis is used, the focus is on cash flows. The investment decision is based on the difference between the net cash inflows and the net cash outflows. Regardless of which method is used; the **net cash advantage** will always be the same. Net cash advantage in favor of replacing old machine is Br. 8,000 as shown above using differential analysis.

Check Your Progress

1. ZiZu Woolen Products Company makes outdoor shirts. A chain store manager has approached the sales manager of ZiZu offering to buy 40, 000 shirts at Br.16.50 per shirt. The offer is to be filled any time during the coming year. Data pertaining to the coming year's planned operations without this order is as follows:

Sales(250,000 shirts)	Br.5, 000, 000
Cost of Sales	4, 150, 000
Gross profit	850, 000
Selling & Administrative Exp.	600,000
Income	**Br.200, 000**

ZiZu Company has a capacity to make 300, 000 shirts per year. Fixed costs included in cost of sales are Br.400, 000. The only variable selling and administrative expenses are a 1% sales commission and a Br.1.25 per shirt fee paid to the designer. The sales manager believes that accepting the offer would result in a loss because the average

total cost of a shirt is Br.19.00. He feels that even though sales commission would not be paid on the order, a loss would result.

Instruction:

a. Determine whether the company should accept the offer. Assume that the special order would not affect existing sales and would not require the sales commission.

b. Suppose the special order was for 60, 000 shirts instead of 40, 000 shirts and sales at regular prices would fall to meet the special order. What would the firm's income be if it accepted the order? Would you recommend the company to accept this special order? Why or why not.

2. Great Company manufactures 60, 000 units of part XL-40 each year for use on its production line. The following are the annual costs of making part XL-40:

	Total Costs	**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.

Instruction:

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 near by 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?

3. In a chemical process two products, X and Y, are produced as a result of a joint production process at the split off point. The joint cost of processing these products totaled Br.12, 000. The quantities produced in a period being 5, 000 liters and 4, 000 liters, respectively. The following data relates to these products:

	Product	
	X	**Y**
Sales Price per liter at split off	**Br.8.50**	**Br.6.00**

Product X is sold at the split off but before agreeing to sale Y at split off, the management wants to know whether it is advisable to process it into another product YZ that can be sold at Br.8.20 per liter. The separable cost of processing Y to YZ is estimated to be Br10, 000 per period. Assume no loss of input in further processing.

Instruction: Would you recommend the company to process Y into YZ? Why or why not?

4. Top Company expects the following results for the coming year.

	X	**Y**	**Z**	**Total**
Sales	Br.100, 000	Br.150, 000	Br.470, 000	Br.720, 000
Variable costs	Br.52, 000	Br.50, 000	Br.190, 000	Br.292, 000

Fixed costs	80, 000	50, 000	240, 000	370, 000
Total costs	132, 000	100, 000	430, 000	662, 000
Profit(Loss)	**(Br.32, 000)**	**Br.50, 000**	**Br.40, 000**	**Br.58, 000**

Instruction. Answer each of the following questions independently.

a. Suppose that all fixed costs are allocated based on the floor space each segment occupies and all are unavoidable. What will total profit be if Top drops the X segment?
b. Suppose that Top could avoid Br.55, 000 in fixed costs by dropping the X segment. However, the managers believe that if they do drop X, sales of each of the other lines will fall by 5%. What will profit be if Top drops X and losses 5% of the sales of each of the other segments?

5.4 SUMMARY

Cost and management accountants supply information for special types of decision-making. The essential quantitative factors influencing such decisions are differential revenues and costs, including opportunity costs. Costs and revenues that will be the same whatever action is taken can be ignored. Historical costs are sunk and irrelevant for current decisions because they cannot be changed by some current action. Avoidable fixed costs are relevant. Whether a cost is relevant to a particular decision does not always depend on whether the cost is variable or fixed.

Typical examples of special types decisions are whether to drop a product or product line, whether to produce a component internally or purchase it from an outside supplier, whether to further process joint products, whether to accept a special order, keep or replace an old

equipment, and how to use limited supply of some critical input factors.

5.5 ANSWERS TO LEARNING ACTIVITY AND CHECK YOUR PROGRESS QUESTIONS

Learning Activity I

1. The only costs that are relevant in making decisions are the expected future costs that will differ among the choices that are available
2. Quantitative factors are those that are measured in numerical terms. Qualitative factors are those outcomes in which measurement in birrs and cents is difficult.

Learning Activity II

1. In joint product the decision to sell at split-off or process further is based on comparing the separable costs and the incremental revenue obtainable by processing further. And the decision will be in favor of further process if the incremental revenue exceeds the separable cost.
2. Joint costs are sunk costs, costs that have been already incurred, in sell or process further decision. Therefore, they are irrelevant for decision making.
3. Incremental revenue (Br.6400-Br.5000) = Br.1, 400
   Incremental costs 1, 000
   Advantage in further processing **Br.400**

Check Your Progress

1. a. Effect of the special order

Incremental revenue		Br.660, 000
Incremental costs		
Cost of Sales (15x40, 000)	Br.600, 000	
Designers Fee (1.25x40,	50,	650,

000)	000	000
Incremental profit		**Br.10, 000**

b.

Incremental revenue(16.50 x 60, 000)		Br.990, 000
Incremental costs		
Cost of Sales (16.25 x40, 000)	Br.975, 000	
Opportunity Cost (16.45x10, 000)	164, 500	1,139,500
Disadvantage in favor of the special order		**(Br.149, 500)**

2. a. Make costs Br120, 000 less

Net relevant costs

Cost to make Br.1, 140, 000

Cost to buy Br.1, 260, 000

c. Buying and manufacturing other product is less costly.

Net relevant costs

Cost to make	Br.1, 140, 000
Buy & Rent out	Br.1, 200, 000
Buy & Manufacture other Product	Br.1, 010, 000

3. It will be better to sell Product Y at split-off .

Product Y

Sales revenue after Further Process (4,000 x Br 8.20)	Br. 32, 800
Less: Sales value at split- off (4,000 x Br. 6.00)	24, 000
Incremental revenue	Br. 8, 800

Less:	Separable (incremental) costs	10, 000
	Disadvantage of processing further	**Br. 1,200**

4. a. Top Company's income will decrease by Br.48, 000.

	Total Before Change	**Effect of Dropping X**	**Total After Change**
Sales	Br.720, 000	Br.100, 000	Br.620, 000
Variable costs	Br.292, 000	Br.52, 000	Br.240, 000
Fixed costs	370, 000	-	370, 000
Total costs	662, 000	52, 000	610, 000
Profit(Loss)	**Br.58, 000**	**Br.48, 000**	**Br.10, 000**

b. Top Company's income will decrease by Br.12, 000.

	Total Before Change	**Effect of Dropping X**	**Effect of Dropping X on Y**	**Effect of Dropping X on Z**	**Total After Change**
Sales	Br.720, 000	Br.100, 000	Br.7, 500	Br.23, 500	Br.589, 000
Variable costs	Br.292, 000	Br.52, 000	Br.2, 500	Br.9, 500	Br.228, 000
Fixed costs	370, 000	55, 000	-	-	315, 000
Total costs	662,	107,	2,	9,	543,

	000	000	500	500	000
Profit(Loss)	**Br.58, 000**	**(Br.7, 000)**	**Br.5, 000**	**Br.14, 000**	**Br.46, 000**

5.6 GLOSSARY

Differential Cost .Any cost that differs between alternatives in a decision-making situation. In managerial accounting, this term is synonymous with avoidable cost and relevant cost.

Sunk cost. Any cost that has already been incurred and that cannot be changed by any decision made now or in the future.

Special order. A one-time order that is not considered part of the company's normal ongoing business.

Constraint. A limitation under which a company must operate, such as limited machine time available or limited raw materials available that restricts the company's ability to satisfy demand.

Make or buy decision. A decision as to whether an item should be produced internally or purchased from an outside supplier.

Joint product costs. Costs that are incurred up to the split-off point in producing joint products.

Joint products. Two or more items that are produced from a common input.

Sell or process further decision. A decision as to whether a joint product should be sold at the split-off point or processed further and sold at a later time in a different form.

Split-off point. That point in the manufacturing process where some or all of the joint products can be recognized as individual products.