Management Accounting

Collections

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Chapter (1)

The Nature of Management Accounting

Chapter One

The Nature of Management Accounting

1. Introduction:

This book is written primarily for managers who are not accounting specialists. All managers use information from accounting systems. By learning about accounting systems, you will better understand the relationships among different components of an organization. You also learn why it is essential to understand the system that generates accounting information in order to use that information in any of a wide variety of functional decisions (including purchasing, manufacturing, inventory management, hiring, marketing, and pricing, among others). You will learn to evaluate whether your accounting system is providing the information you need for your decisions. You will learn to evaluate performance measures generated by your accounting system and assess whether the performance measures create appropriate incentives. In sum, a thorough understanding of accounting is essential for managers in any organization.

When accounting is mentioned, most people think first of financial accounting. Independent auditors- **certified public accountants (CPAs)** in the United States and **chartered accountants (CAs)** in many other nations- provide assurance to external users about the reliability of companies'

published financial statements. Another, even larger, group of people work in private industry and government as management accounting specialists. Though management accountants often help to produce financial statements for external users, they primarily produce accounting information for internal users. The **certified management accountant (CMA)** designation is the management accountant's counterpart to the CPA. The Institute of Management Accountants (IMA) oversees the CMA program. CMAs must pass an examination covering (1) financial planning, performance, and control, and (2) financial decision making. Like the CPA designation, the CMA confers status and often opens the door to higher-level positions.

2. The management accounting function

The role of the management accounting function as an information provider has developed with advances in technology. In order to assess the effectiveness of the management accounting function, a clear understanding is needed of its objectives and activities, so that appropriate measures of performance can be determined. We will now be looking at what the management accounting function should seek to achieve and how its performance should be measured.

3. Role of the management accounting function

The management accounting function exists to provide information to decision-makers, and to provide advice based on information that is provided. The information provided by management accounting covers all areas of strategy and operations, and includes information to assist with planning, control and other decision-making by management. The role of the management accountant today is more concerned with providing complex analysis and information to support business management than with providing routine reports. since much routine work is now computerized. Developments in technology have also made it easier to provide accounting information to non-financial managers. At the same time the areas covered by management accounting have extended and broadened to include strategic information and non–financial information, and information to support risk management. Development in technology have also made it easier to provide accounting information to non-financial managers.

4. The development of management accounting information

In the 1950s Simons identified three attributes of what could by now be called management accounting information:

- It should be useful for scorekeeping- to see how well the organization is doing overall and to monitor performance.
- It should be attention directing to indicate problem areas that need to be investigated.
- It should be useful for problem solving to provide a means of evaluating alternative responses to the situations in which the organization finds itself

Management accounting information is therefore used by managers for number of purposes".

a) To make decisions.
b) To plan for future. Managers have to plan and they need information to do this. Much of this is provided by management accounting systems.
c) To monitor the performance of the business. Managers need to know what they want the business to achieve (targets or standards) and what the business is actually achieving.
d) To measure profits and put a value on inventory.

e) To implement processes and practices that focus on effective and efficient use of organizational resources to support managers to enhance customer and stakeholders value.

5. Defining management objectives of the management accounting function

The objectives of the management accounting function within an organization should depend on the information needs of the internal customers'- the managers who need information to help them to run the business. The overall objective should be the provision of a quality service, but this board objective can be analyzed into a number of sub-objectives.

Sub-objective	Detail
The provision of good information	This requires supplying information that fulfills the following criteria. Information must be relevant to the needs of users. This involves identifying the users of information and the reasons why they need it. Information can only ever be relevant if it has a purpose and a use. Information should be reliable. It should be sufficiently accurate for its purpose. For example it should be free from material error and should not be taken from an unreliable source. Unless information is reliable, management will not have sufficient confidence to use it. Information should be timely, which means that it should be provided in time for the purpose for which it is intended. Information has no value if it is provided too late. Some information, such as information provided for control purposes, may lose value with time, so that it is better to provide the information sooner rather than later. Information should be clear, comprehensible and appropriately communicated, since it will lose its value if it is not clearly communicated to the

	user in a suitable format and through a suitable medium. A large amount of management accounting information should be accessible immediately and on-line to authorized managers.
The provision of value-for-money service	The costs of management accounting should be justified by the benefits that the function provides to the organization, and the level of service and the quality of information provided.
The availability of informed personnel	Users will expect management accounting staff to be available to answer queries and resolve problems as and when required
Flexibility	The management accounting function should be flexible in its response to user requests for information and reports.

6. Management accounting function- Establishing activities

Once the objective have been defined, the activities that the function should carry out to achieve its objectives must be established. This is why it is necessary to answer the question: "what information do we want, or might we want?". The specific information that a management accounting system is required to provide (and the timing or accessibility of this information) will vary between organizations, according to factors such as the nature of their business and their size. The management accounting function should be organized and staffed so that it is able to provide the information expected from it. A follow-up question is: "what type and size of function do we need to provide this information, and what will it cost?".

Management, as users of information, should therefore understand what information they are getting, and what it is costing to get it.

7. Management Accounting Function- Identifying Measures

The performance of the management accounting function should be measured according to its objectives and its specified activities. Suitable specific performance measures might be as follows:

a) Measures relating to the quality of the information provided. Quality measures may be based on the judgment of users, such as opinions about whether the information provided is useful, whether it is timely or provided too late to be much use, and whether it is reliable.
b) Measures relating to value for money. The cost of the function should be measurable, and it may be possible to compare the cost with other information provision services within the organization or in different organizations. The benefits are not so easy to assess, but management need to be satisfied that they are getting value for money.
c) Measures relating to the availability of accounting staff to assist management, such as the amount of time the accounting staff spend with managers in other functions, and the speed of their response to requests for information, advice or assistance.

d) Measures relating to flexibility, such as number of ad-hoc reports issued within pre-set time limit.

e) Ratings provided from user satisfaction surveys would provide extremely useful measures of performance. Users are the internal customers for the management information.

8. Financial Accounting, Management Accounting, and Cost Accounting

As many of you have already seen in your financial accounting class, accounting systems take economic events and transactions, such as sales and materials purchases, and process the data into information helpful to managers, sales representatives, production supervisors, and others. Processing any economic transaction means collecting, categorizing, summarizing, and analyzing. For example, costs are collected by category, such as materials, labor, and shipping.

These costs are then summarized to determine total costs by month, quarter, or year. The results are analyzed to evaluate, say, how costs have changed relative to revenues from one period to the next. Accounting systems provide the information found in the income statement, the balance sheet, the statement of cash flow, and in performance reports, such as the cost of serving customers or running an advertising campaign. Managers use accounting information to administer the activities, businesses, or

functional areas they oversee and to coordinate those activities, businesses, or functions within the framework of the organization. Understanding this information is essential for managers to do their jobs. Individual managers often require the information in an accounting system to be presented or reported differently. Consider, for example, sales order information.

A sales manager may be interested in the total dollar amount of sales to determine the commissions to be paid. A distribution manager may be interested in the sales order quantities by geographic region and by customer-requested delivery dates to ensure timely deliveries. A manufacturing manager may be interested in the quantities of various products and their desired delivery dates, so that he or she can develop an effective production schedule. To simultaneously serve the needs of all three managers, companies create a database—sometimes called a data warehouse or info barn consisting of small, detailed bits of information that can be used for multiple purposes.

For instance, the sales order database will contain detailed information about product, quantity ordered, selling price, and delivery details (place and date) for each sales order. The database stores information in a way that allows different managers to access the information they need. Many companies are building their own Enterprise Resource Planning (ERP) systems, single databases that collect data and feed it into applications that

support the company's business activities, such as purchasing, production, distribution, and sales.

Financial accounting and management accounting have different goals. As many of you know, ***financial accounting*** focuses on reporting to external parties such as investors, government agencies, banks, and suppliers. It measures and records business transactions and provides financial statements that are based on generally accepted accounting principles (GAAP). The most important way that financial accounting information affects managers' decisions and actions is through compensation, which is often, in part, based on numbers in financial statements.

Management accounting measures, analyzes, and reports financial and nonfinancial information that helps managers make decisions to fulfill the goals of an organization. Managers use management accounting information to develop, communicate, and implement strategy. They also use management accounting information to coordinate product design, production, and marketing decisions and to evaluate performance. Management accounting information and reports do not have to follow set principles or rules. The key questions are always (1) how will this information help managers do their jobs better, and (2) do the benefits of

producing this information exceed the costs? Table 1 summarizes the major differences between management accounting and financial accounting.

Table (1)

Distinctions between Management Accounting and Financial Accounting

	Management Accounting	**Financial Accounting**
Purpose	measures, analyzes, and reports financial and nonfinancial information to help managers make decisions to fulfill organizational goals. Managerial accounting does not need to be GAAP compliant.	focus on reporting to external users including investors, creditors, and governmental agencies. Financial statements must be based on GAAP.
Primary users	Organization managers at various levels	Outside parties such as investors and government agencies but also organization managers.
Time focus of reports	Future orientation: formal use of budgets as well as historical records. Example: 20X2 budget versus 20X2 actual performance	Past orientation: historical evaluation; example: 20X2 actual performance versus 20X1 actual performance
Time span of reports	Flexible, varying from hourly to 10–15 years	Less flexible; usually one year or one quarter
Types of reports	Detailed reports include details about products, departments, territories, etc.	Summary reports: primarily report on the entity as a whole
Influence of other functional areas	Field is less sharply defined; heavier use of economics, decision sciences, and behavioral sciences	Field is more sharply defined; lighter use of related disciplines

Cost accounting provides information for management accounting and financial accounting. ***Cost accounting*** measures, analyzes, and reports financial and nonfinancial information relating to the costs of acquiring or using resources in an organization. For example, calculating the cost of a product is a cost accounting function that answers financial accounting's inventory-valuation needs and management accounting’s decision-making

needs (such as deciding how to price products and choosing which products to promote). Modern cost accounting takes the perspective that collecting cost information is a function of the management decisions being made. Thus, the distinction between management accounting and cost accounting is not so clear-cut, and we often use these terms interchangeably in the book.

We frequently hear business people use the term *cost management*. Unfortunately, that term has no uniform definition. We use **cost management** to describe the approaches and activities of managers to use resources to increase value to customers and to achieve organizational goals. Cost management decisions include decisions such as whether to enter new markets, implement new organizational processes, and change product designs. Information from accounting systems helps managers to manage costs, but the information and the accounting systems themselves are not cost management.

Cost management has a broad focus and is not only about reduction in costs. Cost management includes decisions to incur additional costs, for example to improve customer satisfaction and quality and to develop new products, with the goal of enhancing revenues and profits.

9. Decision Making, Planning, and Control: The Five-Step Decision-Making Process

A function of management is decision-making. Managers at all levels within an organization make decisions. Decisions may be taken within the routine planning and control processes. In addition, there are many other decisions, both long term and short term, and routine and occasional, that managers have to make at all levels within the management hierarchy. Decision making always involves a choice between alternative courses of action and it is the role of the management accountant to provide information so that management can reach an informed decision. For example, when comparing actual results against a target when actual results are poor, management needs to decide whether corrective action should be taken or not. A decision to take corrective action may involve considering the different ways in which control may be applied, and choosing the preferred course of action from the available alternatives. Budgeting decisions often involve making a choice between different ways of using the organization's scarce resources (such as cash, equipment and manpower). Many other decisions arise that face management. It is therefore vital that management accountants understand the decision-making process so that they can supply the appropriate type of information.

It is possible to analyze the decision-making process into a sequence of steps. These apply no matter whether the decision is taken immediately, or whether the matter is carefully considered before a decision is reached. This process includes the following steps:

1. **Define the problem**: A decision involves making a choice between two or more courses of action. A decision is made only when the problem is recognized. If a manager is unaware that a problem exists, he will not feel the need to make any decision. A number of planning problems, control problems and other decision problems have been set out above.
2. **Identify the decision-making** criteria: Having recognized that there is a problem for which a decision must be made, the next step is to recognize the decision-making criteria. What are we trying to achieve? In the planning process, the criteria may be to maximize profits over the next 12 months, within the limitations of available resources and subject to limitations on the risks that should be taken. For a planning decision, the decision-making criterion may be to take control measures if possible to enable the organization to achieve its planning targets. More simply, a decision-making criterion for control decisions may be to reduce excessive spending. In management accounting, the decision-making criterion is often to maximize profitability, but as explained earlier, this is not

necessarily appropriate, without giving consideration to the longer term and risk.

3. **Develop alternatives**: Having recognized a problem and recognized what the organization is trying to achieve in resolving the problem, the next step is to recognize different ways in which the problem might be resolved in a way that is consistent with the decision-making criteria. For a simple decision, there may be just two alternatives-"Do it", or Don't do it". However there may be a number of different alternatives, and the process of developing alternatives involves:
    - recognizing the range of possible options and
    - from these selecting a small number of alternatives for evaluation.
4. **Analyze the alternatives**. Each of the alternatives should be analyzed and evaluated. If the decision-making criterion is to maximize short-term profit, each alternatives should be evaluated financially, to estimate the profit that would result from choosing that alternative. Although a management decision is often based on financial considerations, other non-financial factors may also be considered if they are a part of the decision-making criteria.

5. **Select an alternative**. A decision involves selecting one alternative from the two or more that have been analyzed. The recommended choice should be the course of action that resolves the problem in a way that best satisfies the decision-making criterion

Steps 1 through 4 are collectively referred to as *planning*. **Planning** comprises selecting organization goals and strategies, predicting results under various alternative ways of achieving those goals, deciding how to attain the desired goals, and communicating the goals and how to achieve them to the entire organization. Management accountants serve as business partners in these planning activities because of their understanding of what creates value and the key success factors.

The most important planning tool when implementing strategy is a budget. A **budget** is the quantitative expression of a proposed plan of action by management and is an aid to coordinating what needs to be done to execute that plan.

The comparison of actual performance to budgeted performance is the control or post-decision role of information. **Control** comprises taking actions that implement the planning decisions deciding how to evaluate performance, and providing feedback and learning to help future decision making.

10. Qualities of Good Information

Good information should be relevant, complete, accurate, clear, it should inspire confidence, it should be appropriately communicated, its volume should be manageable, it should be timely and its cost to produce should be less than the benefits it provides. Let us look at those qualities in more details.

a) **Relevance**. Information should have a purpose; otherwise there is unlikely to be sufficient benefit from processing data to justify the cost of providing it. Information must be relevant to the purpose for which a manager wants to use it. In practice, far too many reports fail to "keep to the point" and contain irrelevant paragraphs which only distract and consume unnecessary time of the managers reading them.

b) **Completeness**. Information users should have all the information they need to do the job properly. If they do not have a complete picture of the situation, they might well make bad decisions.

c) **Reliability**. Information should be reliable. This means that it should be sufficiently accurate for its purpose. Using incorrect information could have serious and damaging consequences. However, there is no need to go into unnecessary detail. Where there is some uncertainty about the accuracy or reliability, for example, when making forecasts

about the future, the nature of the uncertainty should be fully understood, so that it is used and treated with caution.

d) **Clarity.** Information must be clear to the user. If the user does not understand it properly they will not be able to use it properly. Lack of clarity is one of the causes of a breakdown in communication. It is therefore important to choose the most appropriate presentation medium or channel of communication.

e) **Confidence**. Information must be trusted by the managers who are expected to use it. However not all information is certain. Some information has to be certain, especially operating information, for example, related to a production process. Strategic information, especially relating to the environment, is uncertain. However, if the assumptions underlying it are clearly stated, this might enhance the confidence with which the information is perceived. Having confidence in information depends on other qualities of the information-reliability, relevance and clarity.

f) **Communication**. Within any organization, individuals are given the authority to do certain tasks, and they must be given the information they need to do them. For example, an office manager might be made responsible for controlling expenditure in his office, and given a budget expenditure limit for the year. As the year progresses, they might try to keep expenditure in check but unless they are told

throughout the year what current total expenditure is to date, they will find it difficult to judge whether they are keeping within budget or not.

g) **Volume.** There are physical and mental limitations to what a person can read, absorb and understand properly before taking action. An inappropriate amount of information, even if it is all relevant, cannot be handled. Reports to management must therefore be clear and concise and in many systems, control action works basically on the "exception" principle, with reports only being produced if there is an issue that needs to be brought to management attention or investigated.

h) **Timing.** Information should be timely, if it is not available until after a decision is made, it will be useful only for comparisons and longer-term control, and may serve no purpose even then. Information prepared too frequently can be a serious disadvantage. If, for example, a decision is taken at a monthly meeting about a certain aspect of a company's operations, information to make the decision is only required once a month, and weekly reports would be a time-consuming waste of effort.

i) **Channel of communication**. Information should be communicated or should be accessible through appropriate channels of communications. There are occasions when using one particular method of communication will be better than others. Some internal memoranda may be better sent by "electronic mail". Some information is best communicated informally by telephone or worth-of-mouth, whereas other information ought to be formally communicated in writing or figures. Electronic methods of data transmission, data storage and data access are integral parts of most management accounting systems.

j) **Cost**. Information should have some value, otherwise it would not be worth the cost of collecting and filling it. The benefits obtainable from the information must also exceeds the costs of acquiring it, and whenever management is trying to decide whether or not to produce information for a particular purpose.

11. Roles of Accounting Information

One basic purpose of accounting information is to help you make decisions. Every day, you and your organization face a new and continually changing set of decisions, and many of these decisions rely on accounting information. When you understand how your decisions affect costs and revenues, you will be a better decision maker.

A second basic purpose of accounting is to help you plan and control your organization's operations. Plans describe how the organization will achieve its objectives. Control is the process of implementing plans and evaluating whether your organization is achieving its objectives. When you understand how people respond to the incentives created by performance evaluation and control systems, you will be better able to assess which system creates the most appropriate incentives.

Organizations address these two purposes by designing and implementing accounting systems, which are formal mechanisms for gathering, organizing, and communication information about an organization's activities. The organization of this book reflects how accounting systems address these two basic purposes.

As you progress in your study of management accounting and in your career, you move from understanding how to use information from existing accounting systems to creating systems that produce information useful to your particular decisions. Early in your studies, you initially react to the systems that are described to you, making sure that you understand how each system works and how to use the information it produces in your decisions. Early in your career, you may have little opportunity to influence the management accounting system, and your initial goal is simply to understand and use the information from the accounting system. As you

advance in your studies, you learn about increasingly complex systems designed to provide information for a variety of purposes. As you learn about specific alternatives, you also develop the ability to design new alternatives that provide better information for your decision-making and performance evaluation purposes. Finally, you develop the proficiency and understanding required to evaluate the relative advantages of alternative accounting systems. You will likely see a parallel progression in the use of management accounting in your career. As you advance, you are able to suggest changes to improve the existing systems, and eventually you may be in a position to influence the systems implemented by your organization. The more you can influence management accounting systems, the more important it is to understand their role.

Questions

1. How does management accounting differ from financial accounting?
2. Describe the business functions in the value chain?
3. Describe the five-step decision-making process?
4. Distinguish planning decisions from control decisions?

Chapter (2)

Cost–Volume–Profit Relationships

Chapter (2)

Cost-Volume-Profit Relationships

1. Introduction:

Cost volume-profit (CVP) analysis is a powerful tool that helps managers understand the relationships among cost, volume, and profit. CVP analysis focuses on how profits are affected by the following five factors:

A. Selling prices.

B. Sales volume.

C. Unit variable costs.

D. Total fixed costs.

E. Mix of products sold.

Because CVP analysis helps managers understand how profits are affected by these key factors, it is a vital tool in many business decisions. These decisions include what products and services to offer, what prices to charge, what marketing strategy to use, and what cost structure to implement.

2. **The Basics of Cost-Volume-Profit (CVP) Analysis**

Bob Luchinni's preparation for his forthcoming meeting with Prem begins with the contribution income statement. The contribution income statement emphasizes the behavior of costs and therefore is extremely helpful to managers in judging the impact on profits of changes in selling price, cost, or volume. Bob will base his analysis on the following contribution income statement he prepared last month:

Acoustic Concepts, Inc. Contribution Income Statement For the Month of June		
	Total	**Per Unit**
Sales (400 speakers)	$100,000	$ 250
Variable expenses	60,000	150
Contribution margin	40,000	$ 100
Fixed expenses	35,000	
Net operating income	$ 5,000	

Notice that sales, variable expenses, and contribution margin are expressed on a per unit basis as well as in total on this contribution income statement. The per unit figures will be very helpful to Bob in some of his calculations. Note that this contribution income statement has been prepared for management's use inside the company and would not ordinarily be made available to those outside the company.

A. Contribution Margin

As explained contribution margin is the amount remaining from sales revenue after variable expenses have been deducted. Thus, it is the amount available to cover fixed expenses and then to provide profits for the period. Notice the sequence here-contribution margin is used *first* to cover the fixed expenses, and then whatever remains goes toward profits. If the contribution margin is not sufficient to cover the fixed expenses, then a loss occurs for the period. To illustrate with an extreme example, assume that Acoustic Concepts sells only one speaker during a particular month. The company's income statement would appear as follows:

Contribution Income Statement Sales of 1 Speaker		
	Total	**Per Unit**
Sales (1 speaker)	$ 250	$ 250
Variable expenses	150	150
Contribution margin	100	$ 100
Fixed expenses	35,000	
Net operating income	$ (34,900)	

For each additional speaker the company sells during the month, $100 more in contribution margin becomes available to help cover the fixed expenses. If a second speaker is sold, for example, then the total contribution margin will increase by $100 (to a total of $200) and the company's loss will decrease by $100, to $34,800.

Contribution Income Statement Sales of 2 Speaker		
	Total	**Per Unit**
Sales (2 speaker)	$ 500	$ 250
Variable expenses	300	150
Contribution margin	200	$ 100
Fixed expenses	35,000	
Net operating income	$ (34,800)	

If enough speakers can be sold to generate $35,000 in contribution margin, then all of the fixed expenses will be covered and the company will *break even* for the month-that is, it will show neither profit nor loss but just cover all of its costs. To reach the breakeven point, the company will have to sell 350 speakers in a month because each speaker sold yields $100 in contribution margin:

Contribution Income Statement Sales of 350 Speaker		
	Total	**Per Unit**
Sales (350 speaker)	$ 87,500	$ 250
Variable expenses	52,500	150
Contribution margin	35,000	$ 100
Fixed expenses	35,000	
Net operating income	$ 0	

Computation of the break-even point is discussed in detail later in the chapter; for the moment, note that the **break-even point** is the level of sales at which profit is zero. *Once the break-even point has been reached, net operating income will increase by the amount of the unit contribution margin for each additional unit sold.* For example, if 351 speakers are sold in a month, then the net operating income for the month will be $100

because the company will have sold 1 speaker more than the number needed to break even:

Contribution Income Statement Sales of 351 Speaker		
	Total	**Per Unit**
Sales (351 speaker)	$ 87,750	$ 250
Variable expenses	52,650	150
Contribution margin	35,100	$ 100
Fixed expenses	35,000	
Net operating income	$ 0	

If 352 speakers are sold (2 speakers above the break-even point), the net operating income for the month will be $200. If 353 speakers are sold (3 speakers above the breakeven point), the net operating income for the month will be $300, and so forth. To estimate the profit at any sales volume above the break-even point, simply multiply the number of units sold in excess of the break-even point by the unit contribution margin.

The result represents the anticipated profits for the period. Or, to estimate the effect of a planned increase in sales on profits, simply multiply the increase in units sold by the unit contribution margin. The result will be the expected increase in profits. To illustrate, if Acoustic Concepts is currently selling 400 speakers per month and plans to increase sales to 425 speakers per month, the anticipated impact on profits can be computed as follows:

Increased number of speakers to be sold……	25
Contribution margin per speaker……..	× $100
Increase in net operating income……	$ 2,500

	Sales Volume			
	400 Speakers	**425 Speakers**	**Difference (25 Speakers)**	**Per Unit**
Sales (@ $250 per speaker)	$ 100,000	$ 106,250	$ 6,250	$ 250
Variable expenses (@ $150 per speaker)	60,000	63,750	3,750	150
Contribution margin	40,000	42,500	2,500	$ 100
Fixed expenses	35,000	35,000	0	
Net operating income	$ 5,000	$ 7,500	$ 2,500	

B. CVP Relationships in Equation Form

The contribution format income statement can be expressed in equation form as follows:

Profit = (Sales - Variable expenses) = Fixed expenses

For brevity, we use the term profit to stand for net operating income in equations.

When a company has only a *single* product, as at Acoustic Concepts, we can further refine the equation as follows:

Sales = Selling price per unit × Quantity sold= $P \times Q$

Variable expenses = Variable expenses per unit × Quantity sold = $V \times Q$

Profit =($P \times Q - V \times Q$) - Fixed expenses

We can do all of the calculations of the previous section using this simple equation.

For example, we computed the net operating income (profit) at sales of 351 speakers as $100. We can arrive at the same conclusion using the above equation as follows:

$$\text{Profit} = (P \times Q - V \times Q) - \text{Fixed expenses}$$

$$\text{Profit} = (\$250 \times 351 - \$150 \times 351) - \$35{,}000$$

$$= (\$250 - \$150) \times 351 - \$35{,}000$$

$$= (\$100) \times 351 - \$35{,}000$$

$$= \$35{,}100 - \$35{,}000 = \$100$$

It is often useful to express the simple profit equation in terms of the unit contribution margin (Unit CM) as follows:

$$\text{Unit CM} = \text{Selling price per unit} - \text{Variable expenses per unit} = P - V$$

$$\text{Profit} = (P \times Q - V \times Q) - \text{Fixed expenses}$$

$$\text{Profit} = (P - V) \times Q - \text{Fixed expenses}$$

$$\text{Profit} = \text{Unit CM} \times Q - \text{Fixed expenses}$$

We could also have used this equation to determine the profit at sales of 351 speakers as follows:

$$\text{Profit} = \text{Unit CM} \times Q - \text{Fixed expenses}$$

$$= \$100 \times 351 - \$35{,}000$$

$$= \$35{,}100 - \$35{,}000 = \$100$$

For those who are comfortable with algebra, the quickest and easiest approach to solving the problems in this chapter may be to use the simple profit equation in one of its forms.

C.*Contribution Margin Ratio (CM Ratio)*

In this section, we show how the *contribution margin ratio* can be used in cost- volume-profit calculations. As the first step, we have added a column to Acoustic Concepts' contribution format income statement in which sales revenues, variable expenses, and contribution margin are expressed as a percentage of sales:

	Total	Per Unit	Percent of Sales
Sales (400 speakers)……..	$ 100,000	$ 250	100%
Variable expenses……	60,000	150	60%
Contribution margin……	40,000	$ 100	40%
Fixed expenses……..	35,000		
Net operating income…….	$ 5,000		

The contribution margin as a percentage of sales is referred to as the **contribution margin ratio (CM ratio) .** This ratio is computed as follows:

$$\text{CM ratio} = \frac{\text{Contribution margin}}{\text{Sales}}$$

For Acoustic Concepts, the computations are:

$$\text{CM ratio} = \frac{\text{Total Contribution margin}}{\text{Sales}} = \frac{\$\ 40{,}000}{\$\ 100{,}000} = 40\%$$

In a company such as Acoustic Concepts that has only one product, the CM ratio can also be computed on a per unit basis as follows:

$$\text{CM ratio} = \frac{\text{Unit Contribution margin}}{\text{Unit selling price}} = \frac{\$\ 100}{\$\ 250} = 40\%$$

The CM ratio shows how the contribution margin will be affected by a change in total sales. Acoustic Concepts' CM ratio of 40% means that for each dollar increase in sales, total contribution margin will increase by 40 cents ($1 sales × CM ratio of 40%). Net operating income will also increase by 40 cents, assuming that fixed costs are not affected by the increase in sales.

As this illustration suggests, *the impact on net operating income of any given dollar change in total sales can be computed by simply applying the CM ratio to the dollar change.* For example, if Acoustic Concepts plans a $30,000 increase in sales during the coming month, the contribution margin should increase by $12,000 ($30,000 increase in sales × CM ratio of 40%). As we noted above, net operating income will also increase by $12,000 if fixed costs do not change. This is verified by the following table:

	Sales Volume			
	Present	**Expected**	**Increase**	**Percent of Sales**
Sales ……..	$ 100,000	$ 130,000	$ 30,000	100%
Variable expenses……..	60,000	78,000*	18,000	60%
Contribution margin……	40,000	52,000	12,000	40%
Fixed expenses……	35,000	35,000	0	
Net operating income……..	$ 5,000	$ 17,000	$ 12,000	
*$130,000 expected sales ÷ $250 per unit = 520 units. 520 units × $150 per unit = $78,000				

The relation between profit and the CM ratio can also be expressed using the following equation:

$$\text{Profit} = \text{CM ratio} \times \text{Sales} - \text{Fixed expenses}$$

For example, at sales of $130,000, the profit is expected to be $17,000 as shown below:

$$\text{Profit} = \text{CM ratio} \times \text{Sales} - \text{Fixed expenses}$$

$$= 0.40 \times \$130{,}000 = \$35{,}000$$

$$= \$52{,}000 - \$35{,}000 = \$17{,}000$$

Again, if you are comfortable with algebra, this approach will often be quicker and easier than constructing contribution format income statements.

The CM ratio is particularly valuable in situations where the dollar sales of one product must be traded off against the dollar sales of another product. In this situation, products that yield the greatest amount of contribution margin per dollar of sales should be emphasized.

D.Some Applications of CVP Concepts

Bob Luchinni, the accountant at Acoustic Concepts, wanted to demonstrate to the company's president Prem Narayan how the concepts developed on the preceding pages can be used in planning and decision making. Bob gathered the following basic data:

	Per Unit	Percent of Sales
Selling price…….	$ 250	100%
Variable expenses……	150	60%
Contribution margin…….	$ 100	40%

Recall that fixed expenses are $35,000 per month. Bob Luchinni will use these data to show the effects of changes in variable costs, fixed costs, sales price, and sales volume on the company's profitability in a variety of situations.

Before proceeding further, however, we need to introduce another concept-the *variable expense ratio* . The variable expense ratio is the ratio of variable expenses to sales. It can be computed by dividing the total variable expenses by the total sales, or in a single product analysis, it can be computed by dividing the variable expenses per unit by the unit selling price. In the case of Acoustic Concepts, the variable expense ratio is 0.60; that is, variable expense is 60% of sales.

$$\text{Variable expense ratio} = \frac{\text{Variable Expenses}}{\text{Sales}}$$

This leads to a useful equation that relates the CM ratio to the variable expense ratio as follows:

$$\text{CM ratio} = \frac{\text{Contribution margin}}{\text{Sales}}$$

$$\text{CM ratio} = \frac{\text{Sales - Variable expenses}}{\text{Sales}}$$

$$\text{CM} = 1 - \text{Variable expenses ratio}$$

i. Change in Fixed Cost and Sales Volume

Acoustic Concepts is currently selling 400 speakers per month at $250 per speaker for total monthly sales of $100,000. The sales manager feels that a $10,000 increase in the monthly advertising budget would increase monthly sales by $30,000 to a total of 520 units. Should the advertising budget be increased? The following table shows the financial impact of the proposed change in the monthly advertising budget:

	Current Sales	Sales with Additional Advertising budget	Difference	Percent of Sales
Sales ……..	$ 100,000	$ 130,000	$ 30,000	100%
Variable expenses……	60,000	78,000*	18,000	60%
Contribution margin……	40,000	52,000	12,000	40%
Fixed expenses……..	35,000	45,000**	10,000	
Net operating income…….	$ 5,000	$ 7,000	$ 2,000	
*520 units × $150 per unit = $78,000.				
**$35,000 + additional $10,000 monthly advertising budget = $45,000.				

Assuming no other factors need to be considered, the increase in the advertising budget should be approved because it would increase net operating income by $2,000.

There are two shorter ways to arrive at this solution. The first alternative solution follows:

- ✓ **Alternative Solution 1**

Expected total contribution margin: $130,000 × 40% CM ratio…..	$52,000
Present total contribution margin: $100,000 × 40% CM ratio……..	40,000
Incremental contribution margin……...	12,000
Change in fixed expenses:……	
Less incremental advertising expense……	10,000
Increased net operating income……	$ 2,000

Because in this case only the fixed costs and the sales volume change, the solution can be presented in an even shorter format, as follows:

✓ **Alternative Solution 2**

Incremental contribution margin: $30,000 ×40% CM ratio……	$ 12,000
Less incremental advertising expense……	10,000
Increased net operating income……	$ 2,000

Notice that this approach does not depend on knowledge of previous sales. Also note that it is unnecessary under either shorter approach to prepare an income statement. Both of the alternative solutions involve an incremental analysis - they consider only those items of revenue, cost, and volume that will change if the new program is implemented. Although in each case a new income statement could have been prepared, the incremental approach is simpler and more direct and focuses attention on the specific changes that would occur as a result of the decision.

ii. Change in Variable Costs and Sales Volume

Refer to the original data. Recall that Acoustic Concepts is currently selling 400 speakers per month. Prem is considering the use of higher-quality components, which would increase variable costs (and thereby reduce the contribution margin) by $10 per speaker. However, the sales manager predicts that using higher-quality components would increase sales to 480 speakers per month. Should the higher-quality components be used?

The $10 increase in variable costs would decrease the unit contribution margin by $10- from $100 down to $90.

Solution

Expected total contribution margin with higher-quality components:	
480 speakers × $90 per speaker……....	$43,200
Present total contribution margin: 400 speakers × $100 per speaker…	40,000
Increased net operating income……...	$ 3,200

According to this analysis, the higher-quality components should be used. Because fixed costs would not change, the $3,200 increase in contribution margin shown above should result in a $3,200 increase in net operating income.

iii. Change in Fixed Cost, Sales Price, and Sales Volume

Refer to the original data and recall again that Acoustic Concepts is currently selling 400 speakers per month. To increase sales, the sales manager would like to cut the selling price by $20 per speaker and increase the advertising budget by $15,000 per month. The sales manager believes that if these two steps are taken, unit sales will increase by 50% to 600 speakers per month. Should the changes be made?

A decrease in the selling price of $20 per speaker would decrease the unit contribution margin by $20 down to $80.

Solution

Expected total contribution margin with lower selling price: 600 speakers × $80 per speaker……	$48,000
Present total contribution margin: 400 speakers × $100 per speaker…	40,000
Incremental contribution margin……..	8,000
Change in fixed expenses…….	
Less incremental advertising expense……	15,000
Reduction in net operating income……	$(7,000)

According to this analysis, the changes should not be made. The $7,000 reduction in net operating income that is shown above can be verified by preparing comparative income statements as follows:

	Present 400 Speakers per Month		**Expected 600 Speakers per Month**		
	Total	**Per Unit**	**Total**	**Per Unit**	**Difference**
Sales ……	$ 100,000	$ 250	$ 138,000	$ 250	$ 38,000
Variable expenses……	60,000	150	90,000	150	30,000
Contribution margin…….	40,000	$ 100	48,000	$ 100	8,000
Fixed expenses…….	35,000		50,000*		15,000
Net operating income (loss)…….	$ 5,000		$(2,000)		$(7,000)
*35,000 + Additional monthly advertising budget of $15,000 = $50,000					

iv. **Change in Variable Cost, Fixed Cost, and Sales Volume**

Refer to Acoustic Concepts' original data. As before, the company is currently selling 400 speakers per month. The sales manager would like to pay salespersons a sales commission of $15 per speaker sold, rather than the flat salaries that now total $6,000 per month. The sales manager is confident that the change would increase monthly sales by 15% to 460 speakers per month. Should the change be made?

Solution

Changing the sales staff's compensation from salaries to commissions would affect both fixed and variable expenses. Fixed expenses would decrease by $6,000, from $35,000 to $29,000. Variable expenses per unit would increase by $15, from $150 to $165, and the unit contribution margin would decrease from $100 to $85.

Expected total contribution margin with sales staff on commissions: 460 speakers × $85 per speaker…….	$39,100
Present total contribution margin: 400 speakers × $100 per speaker….	40,000
Decrease in total contribution margin…….	(900)
Change in fixed expenses	
Add salaries avoided if a commission is paid…….	6,000
Increase in net operating income…….	$5,100

According to this analysis, the changes should be made. Again, the same answer can be obtained by preparing comparative income statements:

	Present 400 Speakers per Month		Expected 600 Speakers per Month		
	Total	**Per Unit**	**Total**	**Per Unit**	**Difference**
Sales …….	$ 100,000	$ 250	$ 115,000	$ 250	$ 15,000
Variable expenses….....	60,000	150	75,900	165	15,900
Contribution margin…….	40,000	$ 100	39,100	$ 85	900
Fixed expenses…….	35,000		29,000		(6,000)*
Net operating income …..	$ 5,000		$10,100		$5,100

*Note: A *reduction* in fixed expenses has the effect of *increasing* net operating income.

v. Change in Selling Price

Refer to the original data where Acoustic Concepts is currently selling 400 speakers per month. The company has an opportunity to make a bulk sale of 150 speakers to a wholesaler if an acceptable price can be negotiated. This sale would not disturb the company's regular sales and would not affect the company's total fixed expenses. What price per speaker should be quoted to the wholesaler if Acoustic Concepts wants to increase its total monthly profits by $3,000?

Solution

Variable cost per speaker……	$150
Desired profit per speaker: $3,000 ÷150 speakers……	20
Quoted price per speaker……	$ 170

Notice that fixed expenses are not included in the computation. This is because fixed expenses are not affected by the bulk sale, so all of the additional contribution margin increases the company's profits.

3. Target Profit and Break-Even Analysis

Target profit analysis and break-even analysis are used to answer questions such as how much would we have to sell to make a profit of $10,000 per month or how much would we have to sell to avoid incurring a loss?

A. *Target Profit Analysis*

One of the key uses of CVP analysis is called *target profit analysis* . In **target profit analysis ,** we estimate what sales volume is needed to achieve a specific target profit. For example, suppose that Prem Narayan of Acoustic Concepts would like to know what sales would have to be to attain a target profit of $40,000 per month. To answer this question, we can proceed using the equation method or the formula method.

➢ The Equation Method

We can use a basic profit equation to find the sales volume required to attain a target profit. In the case of Acoustic Concepts, the company has only one product so we can use the contribution margin form of the equation. Remembering that the target profit is $40,000, the unit

contribution margin is $100, and the fixed expense is $35,000, we can solve as follows:

Profit = Unit CM × Q - Fixed expense

$40,000 = $100 × Q - $35,000

$100×$Q$= $40,000 + $35,000

Q= ($40,000+ $35,000) ÷ $100

Q =750

Thus, the target profit can be achieved by selling 750 speakers per month.

- **The Formula Method**

The formula method is a short-cut version of the equation method. Note that in the next to the last line of the above solution, the sum of the target profit of $40,000 and the fixed expense of $35,000 is divided by the unit contribution margin of $100. In general, in a single-product situation, we can compute the sales volume required to attain a specific target profit using the following formula:

$$\textbf{Unit sales to attain the target profit} = \frac{\text{Target profit + Fixed expenses}}{\text{Unit CM}}$$

In the case of Acoustic Concepts, the formula yields the following answer:

$$\textbf{Unit sales to attain the target profit} = \frac{\text{Target profit + Fixed expenses}}{\text{Unit CM}}$$

$$= \frac{\$40{,}000 + \$\ 35{,}000}{\$\ 100} = \mathbf{750}$$

Note that this is the same answer we got when we used the equation method- and it always will be. The formula method simply skips a few steps in the equation method.

B. Target Profit Analysis in Terms of Sales Dollars

Instead of unit sales, we may want to know what dollar sales are needed to attain the target profit. We can get this answer using several methods. First, we could solve for the unit sales to attain the target profit using the equation method or the formula method and then multiply the result by the selling price. In the case of Acoustic Concepts, the required sales volume using this approach would be computed as 750 speakers × $250 per speaker or $187,500 in total sales.

We can also solve for the required sales volume to attain the target profit of $40,000 at Acoustic Concepts using the basic equation stated in terms of the contribution margin ratio:

$$\text{Profit} = \text{CM ratio} \times \text{Sales} - \text{Fixed expenses}$$

$$\$40{,}000 = 0.40 \times \text{Sales} - \$35{,}000$$

$$0.40 \times \text{Sales} = \$40{,}000 + \$35{,}000$$

$$\text{Sales} = (\$40{,}000 + \$35{,}000) \div 0.40$$

$$\text{Sales} = \$187{,}500$$

Note that in the next to the last line of the above solution, the sum of the target profit of $40,000 and the fixed expense of $35,000 is divided by the contribution margin ratio of 0.40. In general, we can compute dollar sales to attain a target profit as follows:

$$\textbf{Dollar sales to attain the target profit} = \frac{\text{Target profit + Fixed expenses}}{\text{CM ratio}}$$

At Acoustic Concepts, the formula yields the following answer:

$$\textbf{Dollar sales to attain the target profit} = \frac{\text{Target profit + Fixed expenses}}{\text{CM ratio}}$$

$$= \frac{\$\ 40{,}000 + \$\ 35{,}000}{\$\ 0.40} = \$\ 187{,}500$$

Again, you get exactly the same answer whether you use the equation method or just use the formula.

In companies with multiple products, sales volume is more conveniently expressed in terms of total sales dollars than in terms of unit sales. The contribution margin ratio approach to target profit analysis is particularly useful for such companies.

C.*Break-Even Analysis*

Earlier in the chapter we defined the break-even point as the level of sales at which the company's profit is zero. What we call *break-even analysis* is really just a special case of target profit analysis in which the target profit is zero. We can use either the equation method or the formula method to solve for the break-even point, but for brevity we will illustrate just the formula method. The equation method works exactly like it did in target profit analysis. The only difference is that the target profit is zero in break-even analysis.

D.Break-Even in Unit Sales

In a single product situation, recall that the formula for the unit sales to attain a specific target profit is:

$$\textbf{Unit sales to attain the target profit} = \frac{\text{Target profit + Fixed expenses}}{\text{Unit CM}}$$

To compute the unit sales to break even, all we have to do is to set the target profit to zero in the above equation as follows:

$$\textbf{Unit sales to break even} = \frac{\$\ 0 + \text{Fixed expenses}}{\text{Unit CM}}$$

$$\textbf{Unit sales to break even} = \frac{\text{Fixed expenses}}{\text{Unit CM}}$$

In the case of Acoustic Concepts, the break-even point can be computed as follows:

$$\textbf{Unit sales to break even} = \frac{\text{Fixed expenses}}{\text{Unit CM}}$$

$$= \frac{\$\ 35{,}000}{\$\ 100} = 350$$

Thus, as we determined earlier in the chapter, Acoustic Concepts breaks even at sales of 350 speakers per month.

E. Break-Even in Sales Dollars

We can find the break-even point in sales dollars using several methods. First, we could solve for the break-even point in unit sales using the equation method or the formula method and then multiply the result by the selling price. In the case of Acoustic Concepts, the break-even point in sales dollars using this approach would be computed as 350 speakers × $250 per speaker or $87,500 in total sales.

We can also solve for the break-even point in sales dollars at Acoustic Concepts using the basic profit equation stated in terms of the contribution margin ratio or we can use the formula for the target profit. Again, for brevity, we will use the formula.

$$\textbf{Dollar sales attain the target profit} = \frac{\text{Target profit + Fixed expenses}}{\text{CM ratio}}$$

$$\textbf{Dollar sales to break even} = \frac{\$\ 0 + \text{Fixed expenses}}{\text{CM ratio}}$$

$$\textbf{Dollar sales to break even} = \frac{\text{Fixed expenses}}{\text{CM ratio}}$$

The break-even point at Acoustic Concepts would be computed as follows:

$$\textbf{Dollar sales to break even} = \frac{\text{Fixed expenses}}{\text{CM ratio}}$$

$$\textbf{Dollar sales to break even} = \frac{\$\ 35{,}000}{0.40} = \textbf{\$ 87,500}$$

4. The Margin of Safety

The margin of safety is the excess of budgeted (or actual) sales dollars over the breakeven volume of sales dollars. It is the amount by which sales can drop before losses are incurred. The higher the margin of safety, the lower the risk of not breaking even and incurring a loss. The formula for the margin of safety is:

$$\textbf{Margin of safety in dollars} = \text{Total budgeted (or actual) sales} - \text{Break-even sales}$$

The margin of safety can also be expressed in percentage form by dividing the margin of safety in dollars by total dollar sales:

$$\textbf{Margin of safety percentage} = \frac{\text{Margin of safety in dollars}}{\text{Total budgeted (or actual) sales in dollars}}$$

The calculation of the margin of safety for Acoustic Concepts is:

Sales (at the current volume of 400 speakers) (a)……..	$100,000
Break-even sales (at 350 speakers)……	87,000
Margin of safety in dollars (b)……	$ 12,500
Margin of safety percentage, (b) ÷ (a)……	12.5%

This margin of safety means that at the current level of sales and with the company's current prices and cost structure, a reduction in sales of $12,500, or 12.5%, would result in just breaking even.

In a single-product company like Acoustic Concepts, the margin of safety can also be expressed in terms of the number of units sold by dividing the margin of safety in dollars by the selling price per unit. In this case, the margin of safety is 50 speakers ($12,500 ÷ $250 per speaker = 50 speakers).

5. Sales Mix

Before concluding our discussion of CVP concepts, we need to consider the impact of changes in *sales mix* on a company's profit.

A.The Definition of Sales Mix

The term sales mix refers to the relative proportions in which a company's products are sold. The idea is to achieve the combination, or mix, that will yield the greatest amount of profits. Most companies have many products, and often these products are not equally profitable. Hence, profits will depend to some extent on the company's sales mix. Profits will be greater if high-margin rather than low-margin items make up a relatively large proportion of total sales.

Changes in the sales mix can cause perplexing variations in a company's profits. A shift in the sales mix from high-margin items to low-margin items can cause total profits to decrease even though total sales may increase. Conversely, a shift in the sales mix from low-margin items to high-margin items can cause the reverse effect-total profits may increase

even though total sales decrease. It is one thing to achieve a particular sales volume; it is quite another to sell the most profitable mix of products.

B. Sales Mix and Break-Even Analysis

If a company sells more than one product, break-even analysis is more complex than discussed to this point. The reason is that different products will have different selling prices, different costs, and different contribution margins. Consequently, the break-even point depends on the mix in which the various products are sold. To illustrate, consider Virtual Journeys Unlimited, a small company that imports DVDs from France. At present, the company sells two DVDs: the Le Louvre DVD, a tour of the famous art museum in Paris; and the Le Vin DVD, which features the wines and wine-growing regions of France. The company's September sales, expenses, and break-even point are shown in **Table (1)**.

As shown in the table, the break-even point is $60,000 in sales, which was computed by dividing the company's fixed expenses of $27,000 by its overall CM ratio of 45%. However, this is the break-even only if the company's sales mix does not change. Currently, the Le Louvre DVD is responsible for 20% and the Le Vin DVD for 80% of the company's dollar sales. Assuming this sales mix does not change, if total sales are $60,000, the sales of the Le Louvre DVD would be $12,000 (20% of $60,000) and the sales of the Le Vin DVD would be $48,000 (80% of $60,000). As

shown in **Table (1)**, at these levels of sales, the company would indeed break even. But $60,000 in sales represents the break-even point for the company only if the sales mix does not change. *If the sales mix changes, then the break-even point will also usually change.* This is illustrated by the results for October in which the sales mix shifted away from the more profitable Le Vin DVD (which has a 50% CM ratio) toward the less profitable Le Louvre CD (which has a 25% CM ratio). These results appear in **Table (2).**

Although sales have remained unchanged at $100,000, the sales mix is exactly the reverse of what it was in **Table (1)**, with the bulk of the sales now coming from the less profitable Le Louvre DVD. Notice that this shift in the sales mix has caused both the overall CM ratio and total profits to drop sharply from the prior month even though total sales are the same. The overall CM ratio has dropped from 45% in September to only 30% in October, and net operating income has dropped from $18,000 to only $3,000. In addition, with the drop in the overall CM ratio, the company's break-even point is no longer $60,000 in sales. Because the company is now realizing less average contribution margin per dollar of sales, it takes more sales to cover the same amount of fixed costs. Thus, the break-even point has increased from $60,000 to $90,000 in sales per year.

In preparing a break-even analysis, an assumption must be made concerning the sales mix. Usually the assumption is that it will not change. However, if the sales mix is expected to change, then this must be explicitly considered in any CVP computations.

Table (1) Multiproduct Break-Even Analysis

Virtual Journeys Unlimited Contribution Income Statement For the Month of September						
	Le Louvre DVD		Le Vin DVD		Total	
	Amount	%	Amount	%	Amount	%
Sales ……..	$20,000	100%	$80,000	100%	$100,000	100%
Variable expenses……..	15,000	75%	40,000	50%	55,000	55%
Contribution margin…..	$ 5,000	25%	$40,000	50%	45,000	45%
Fixed expenses…….					(27,000)	
Net operating income ….					$18,000	

Computation of the break-even point

$$\frac{\text{Fixed expenses}}{\text{Overall CM ratio}} = \frac{\$27,000}{0.45} = \$60,000$$

✓ **Verification of the break-even point:**

	Le Louvre DVD	**Le Vin DVD**	**Total**
Current dollar sales ……	$20,000	$80,000	$100,000
Percentage of total dollar sales……..	20%	80%	100%
Sales at the break-even point…….	$12,000	$48,000	$60,000

	Le Louvre DVD		**Le Vin DVD**		**Total**	
	Amount	**%**	**Amount**	**%**	**Amount**	**%**
Sales ……..	$ 12,000	100%	$48,000	100%	$60,000	100%
Variable expenses……..	9,000	75%	24,000	50%	33,000	55%
Contribution margin…..	$ 3,000	25%	$24,000	50%	27,000	45%
Fixed expenses……..					27,000	
Net operating income …					$ 0	

Table (2)

Multiproduct Break-Even Analysis: A Shift in Sales Mix (see table (1))

Virtual Journeys Unlimited Contribution Income Statement For the Month of October						
	Le Louvre DVD		Le Vin DVD		Total	
	Amount	%	Amount	%	Amount	%
Sales	$80,000	100%	$20,000	100%	$100,000	100%
Variable expenses	60,000	75%	10,000	50%	70,000	70%
Contribution margin	$ 20,000	25%	$10,000	50%	30,000	30%
Fixed expenses					27,000	
Net operating income					$3,000	

$$\frac{\text{Fixed expenses}}{\text{Overall CM ratio}} = \frac{\$27,000}{0.30} = \$90,000$$

6. Assumptions of CVP Analysis

1. A number of assumptions commonly underlie CVP analysis:
2. Selling price is constant. The price of a product or service will not change as volume changes.
3. Costs are linear and can be accurately divided into variable and fixed elements. The variable element is constant per unit, and the fixed element is constant in total over the entire relevant range.
4. In multiproduct companies, the sales mix is constant.
5. In manufacturing companies, inventories do not change. The number of units produced equals the number of units sold.

While these assumptions may be violated in practice, the results of CVP analysis are often “good enough” to be quite useful. Perhaps the greatest danger lies in relying on simple CVP analysis when a manager is contemplating a large change in volume that lies outside of the relevant range. For example, a manager might contemplate increasing the level of sales far beyond what the company has ever experienced before. However, even in these situations the model can be adjusted as we have done in this chapter to take into account anticipated changes in selling prices, fixed costs, and the sales mix that would otherwise violate the assumptions mentioned above. For example, in a decision that would affect fixed costs, the change in fixed costs can be explicitly taken into account .

Problems

1. Preparing a Contribution Format Income Statement

Whirly Corporation's most recent income statement is shown below:

	Total	Per Unit
Sales (10,000 units)……..	$350,000	$ 35.00
Variable expenses…….	200,000	20.00
Contribution margin…….	150,000	$ 15.00
Fixed expenses…….	135,000	
Net operating income……	$ 15,000	

Required:

Prepare a new contribution format income statement under each of the following conditions (consider each case independently):

A. The sales volume increases by 100 units.

B. The sales volume decreases by 100 units.

C. The sales volume is 9,000 units.

2. Computing and Using the CM Ratio

Last month when Holiday Creations, Inc., sold 50,000 units, total sales were $200,000, total variable expenses were $120,000, and fixed expenses were $65,000.

Required:

A. What is the company's contribution margin (CM) ratio?

B. Estimate the change in the company's net operating income if it were to increase its total sales by $1,000.

3. Changes in Variable Costs, Fixed Costs, Selling Price, and Volume

Data for Hermann Corporation are shown below:

	Per Unit	Percent of Sales
Selling price……..	$90	100%
Variable expenses…….	63	70
Contribution margin……	$27	30%

Fixed expenses are $30,000 per month and the company is selling 2,000 units per month.

Required:

A. The marketing manager argues that a $5,000 increase in the monthly advertising budget would increase monthly sales by $9,000. Should the advertising budget be increased?

B. Refer to the original data. Management is considering using higher-quality components that would increase the variable cost by $2 per unit. The marketing manager believes the higher-quality product would increase sales by 10% per month. Should the higher-quality components be used?

4. Compute the Level of Sales Required to Attain a Target Profit

Lin Corporation has a single product whose selling price is $120 and whose variable expense is $80 per unit. The company's monthly fixed expense is $50,000.

Required:

A. Using the equation method, solve for the unit sales that are required to earn a target profit of $10,000.

B. Using the formula method, solve for the unit sales that are required to earn a target profit of $15,000.

5. Compute the Break-Even Point

Mauro Products distributes a single product, a woven basket whose selling price is $15 and whose variable expense is $12 per unit. The company's monthly fixed expense is $4,200.

Required:

A. Solve for the company's break-even point in unit sales using the equation method.

B. Solve for the company's break-even point in sales dollars using the equation method and the CM ratio.

C. Solve for the company's break-even point in unit sales using the formula method.

D. Solve for the company's break-even point in sales dollars using the formula method and the CM ratio.

6. Compute the Margin of Safety

Molander Corporation is a distributor of a sun umbrella used at resort hotels. Data concerning the next month's budget appear below:

Selling price	$30 per unit
Variable expenses	$20 per unit
Fixed expenses	$7,500 per month
Unit sales	1,000 units per month

Required:

A. Compute the company's margin of safety.

B. Compute the company's margin of safety as a percentage of its sales.

7. Compute and Use the Degree of Operating Leverage:

Engberg Company installs lawn sod in home yards. The company's most recent monthly contribution format income statement follows:

	Amount	Percent of Sales
Sales	$80,000	100%
Variable expenses	32,000	40%
Contribution margin	48,000	60%
Fixed expenses	38,000	
Net operating income	$10,000	

Required:

A. Compute the company's degree of operating leverage.

B. Using the degree of operating leverage, estimate the impact on net operating income of a 5% increase in sales.

C. Verify your estimate from part (2) above by constructing a new contribution format income statement for the company assuming a 5% increase in sales.

8. Compute the Break-Even Point for a Multiproduct Company:

Lucido Products markets two computer games: Claimjumper and Makeover. A contribution format income statement for a recent month for the two games appears on the following page:

	Claimjumper	Makeover	Total
Sales	$ 30,000	$ 70,000	$ 100,000
Variable expenses	20,000	50,000	70,000
Contribution margin	$10,000	$20,000	30,000
Fixed expenses			24,000
Net operating income			$ 6,000

Required:

A. Compute the overall contribution margin (CM) ratio for the company.

B. Compute the overall break-even point for the company in sales dollars.

C. Verify the overall break-even point for the company by constructing a contribution format income statement showing the appropriate levels of sales for the two products.

9. Using a Contribution Format Income Statement

Miller Company's most recent contribution format income statement is shown below:

	Total	Per Unit
Sales (20,000 units)	$300,000	$ 15.00
Variable expenses	180,000	9.00
Contribution margin	120,000	$ 6.00
Fixed expenses	70,000	
Net operating income	$ 50,000	

Required:

Prepare a new contribution format income statement under each of the following conditions (consider each case independently):

A. The number of units sold increases by 15%.

B. The selling price decreases by $1.50 per unit, and the number of units sold increases by 25%.

C. The selling price increases by $1.50 per unit, fixed expenses increase by $20,000, and the number of units sold decreases by 5%.

D. The selling price increases by 12%, variable expenses increase by 60 cents per unit, and the number of units sold decreases by 10%.

10. Target Profit and Break-Even Analysis; Margin of Safety; CM Ratio

Menlo Company distributes a single product. The company's sales and expenses for last month follow:

	Total	Per Unit
Sales	$450,000	$ 30
Variable expenses	180,000	12
Contribution margin	270,000	$ 18
Fixed expenses	216,000	
Net operating income	$ 54,000	

Required:

A. What is the monthly break-even point in units sold and in sales dollars?

B. Without resorting to computations, what is the total contribution margin at the break-even point?

C. How many units would have to be sold each month to earn a target profit of $90,000? Use the formula

D. method. Verify your answer by preparing a contribution format income statement at the target sales level.

E. Refer to the original data. Compute the company's margin of safety in both dollar and percentage terms.

F. What is the company's CM ratio? If sales increase by $50,000 per month and there is no change in fixed expenses, by how much would you expect monthly net operating income to increase?

11. Target Profit and Break-Even Analysis:

Lindon Company is the exclusive distributor for an automotive product that sells for $40 per unit and has a CM ratio of 30%. The company's fixed expenses are $180,000 per year. The company plans to sell 16,000 units this year.

Required:

A. What are the variable expenses per unit?

B. Using the equation method:

   i. What is the break-even point in units and sales dollars?

   ii. What sales level in units and in sales dollars is required to earn an annual profit of $60,000?

   iii. Assume that by using a more efficient shipper, the company is able to reduce its variable expenses by $4 per unit. What is the company's new break-even point in units and sales dollars?

C. Repeat (2) above using the formula method.

12. Target Profit and Break-Even Analysis

Outback Outfitters sells recreational equipment. One of the company's products, a small camp stove, sells for $50 per unit. Variable expenses are $32 per stove, and fixed expenses associated with the stove total $108,000 per month.

Required:

A. Compute the break-even point in number of stoves and in total sales dollars.

B. If the variable expenses per stove increase as a percentage of the selling price, will it result in a higher or a lower break-even point? Why? (Assume that the fixed expenses remain unchanged.)

C. At present, the company is selling 8,000 stoves per month. The sales manager is convinced that a 10% reduction in the selling price would result in a 25% increase in monthly sales of stoves. Prepare two contribution format income statements, one under present operating conditions, and one as operations would appear after the proposed changes. Show both total and per unit data on your statements.

D. Refer to the data in (c) above. How many stoves would have to be sold at the new selling price to yield a minimum net operating income of $35,000 per month?

13. Multiproduct Break-Even Analysis

Olongapo Sports Corporation is the distributor in the Philippines of two premium golf balls-the Flight Dynamic and the Sure Shot. Monthly sales, expressed in pesos (P), and the contribution margin ratios for the two products follow:

	Product		
	Flight Dynamic	**Sure Shot**	**Total**
Sales	P150,000	P250,000	P400,000
CM ratio	80%	36%	?

Fixed expenses total P183,750 per month.

Required:

A. Prepare a contribution format income statement for the company as a whole. Carry computations to one decimal place.

B. Compute the break-even point for the company based on the current sales mix.

C. If sales increase by P100,000 a month, by how much would you expect net operating income to increase? What are your assumptions?

Bubble Answer Sheet

(A) (B) (C) (D)

1. (A) (B) (C) (D)	18. (A) (B) (C) (D)	35. (A) (B) (C) (D)
2. (A) (B) (C) (D)	19. (A) (B) (C) (D)	36. (A) (B) (C) (D)
3. (A) (B) (C) (D)	20. (A) (B) (C) (D)	37. (A) (B) (C) (D)
4. (A) (B) (C) (D)	21. (A) (B) (C) (D)	38. (A) (B) (C) (D)
5. (A) (B) (C) (D)	22. (A) (B) (C) (D)	39. (A) (B) (C) (D)
6. (A) (B) (C) (D)	23. (A) (B) (C) (D)	40. (A) (B) (C) (D)
7. (A) (B) (C) (D)	24. (A) (B) (C) (D)	41. (A) (B) (C) (D)
8. (A) (B) (C) (D)	25. (A) (B) (C) (D)	42. (A) (B) (C) (D)
9. (A) (B) (C) (D)	26. (A) (B) (C) (D)	43. (A) (B) (C) (D)
10. (A) (B) (C) (D)	27. (A) (B) (C) (D)	44. (A) (B) (C) (D)
11. (A) (B) (C) (D)	28. (A) (B) (C) (D)	45. (A) (B) (C) (D)
12. (A) (B) (C) (D)	29. (A) (B) (C) (D)	46. (A) (B) (C) (D)
13. (A) (B) (C) (D)	30. (A) (B) (C) (D)	47. (A) (B) (C) (D)
14. (A) (B) (C) (D)	31. (A) (B) (C) (D)	48. (A) (B) (C) (D)
15. (A) (B) (C) (D)	32. (A) (B) (C) (D)	49. (A) (B) (C) (D)
16. (A) (B) (C) (D)	33. (A) (B) (C) (D)	50. (A) (B) (C) (D)
17. (A) (B) (C) (D)	34. (A) (B) (C) (D)	

Bubble Answer Sheet

(A) (B) (C) (D)

1. (A) (B) (C) (D)	18. (A) (B) (C) (D)	35. (A) (B) (C) (D)
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17. (A) (B) (C) (D)	34. (A) (B) (C) (D)	

Chapter (3)

Relevant Information for Decision Making with a Focus on Pricing Decisions

Chapter (3)

Relevant Information for Decision Making with a Focus on Pricing Decisions

1. Introduction

What information is relevant to a decision maker? That depends on the decision being made. Decision making is essentially choosing among several alternative courses of action. Decision makers identify the available alternatives by an often time-consuming search and screening process, perhaps carried out by a company team that includes engineers, accountants, and operating executives. The accountant's role is primarily that of a technical expert on financial analysis who provides information that may be useful to the decision maker. However, the decision maker, who has the best understanding of the decision and the available alternatives, must understand what information is relevant.

A. What Is Relevance?

Making business decisions requires managers to compare two or more alternative courses of action. Two criteria determine whether financial information is relevant: (1) Information must be an expected future revenue or cost, and (2) it must have an element of difference among the alternatives. That is, **relevant information** is the predicted future costs and revenues that will differ among the alternatives.

Note that relevant information is a prediction of the future, not a summary of the past. Historical (past) information has no direct bearing on a decision. Such information can have an indirect bearing on a decision because it may help in predicting the future. But past figures, in themselves, are irrelevant to the decision itself. Why? Because the decision cannot change the past. Decisions affect the future. Nothing can alter what has already happened.

Of the expected future information, only data that will differ across alternatives are relevant to the decision. Any item that will remain the same regardless of the alternative selected is irrelevant. For instance, if a department manager's salary will be the same regardless of the products produced, the salary is irrelevant to the selection of products. Here are some examples to help you clarify the sharp distinctions between relevant and irrelevant information.

Suppose you always buy gasoline from either of two nearby gasoline stations. Yesterday you noticed that one station was selling gasoline at $3.90 per gallon. The other was selling it at $3.80. Your automobile needs gasoline today, and in making your choice of stations, you assume that these prices have not changed. The relevant costs are $3.90 and $3.80, the expected future costs that will differ between the alternatives. You use your past experience (that is, what you observed yesterday) for predicting

today's price. Note that the relevant cost is not what you paid in the past, or what you observed yesterday, but what you expect to pay when you drive in to get gasoline. This cost meets our two criteria: (1) It is the expected future cost, and (2) it differs between the alternatives.

You may also plan to buy a bag of potato chips when you stop for gasoline. Suppose you expect the price of a bag of chips to be the same at either station. This expected future cost is irrelevant to your decision about which station to stop at because it will be the same under either alternative. It does not meet our second criterion.

On a business level, consider the following decision. A food container manufacturer is thinking of using aluminum instead of tin in making a line of large cans. The cost of direct material is expected to decrease from $0.30 per can if tin is used to $0.20 per can if the manufacturer uses aluminum.

The direct-labor cost will continue to be $0.70 per unit regardless of the material used. Direct-labor cost is irrelevant because our second criterion-an element of difference between the alternatives-is not met.

	Aluminum	**Tin**	**Difference**
Direct material……..	$0.20	$0.30	$0.10
Direct labor……..	0.70	0.70	-

In this example, the relevant cost is the cost of direct materials. We can safely exclude direct labor from the comparison of alternatives because it does not differ between the alternatives.

B. A Decision Model

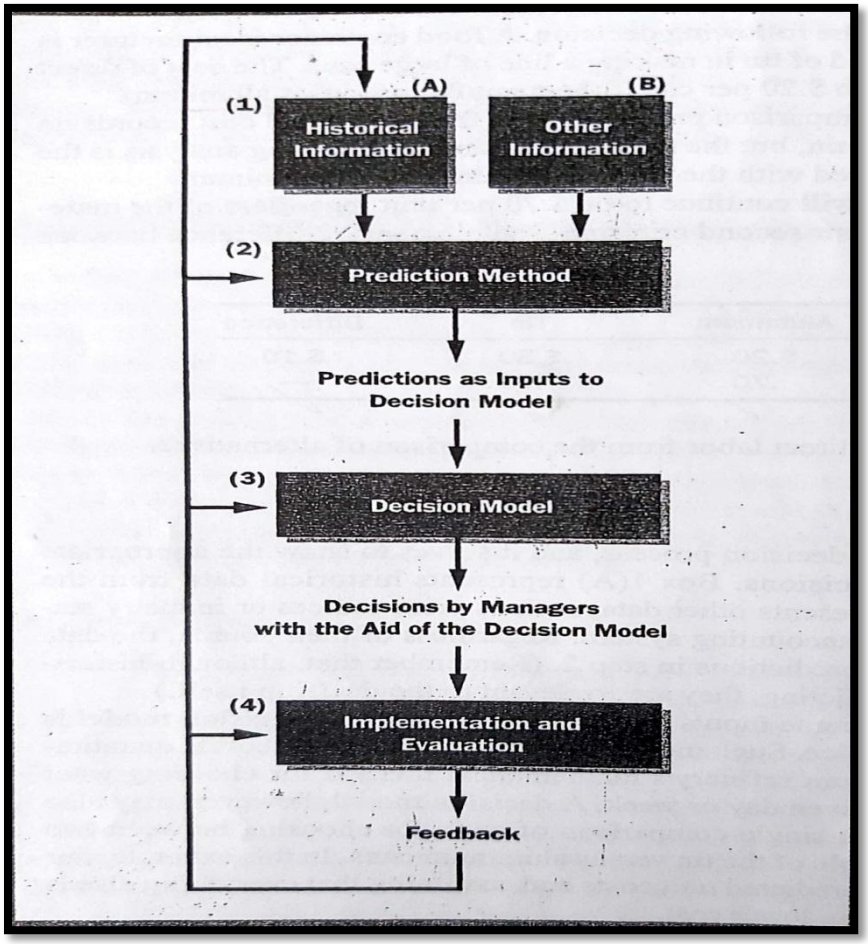
Figure 1 illustrates this simple decision process, and it serves to show the appropriate framework for more complex decisions. Box 1(A) represents historical data from the accounting system. Box 1(B) represents other data, such as price indices or industry statistics, gathered from outside the accounting system. Regardless of their source, the data in step 1 help the formulation of predictions in step 2. (Remember that historical data are only relevant as a guide to predicting future costs and revenues. In the large-can manufacturing example, the historical costs of tin and aluminum are only relevant as predictors of future prices.).

In step 3, these predictions become inputs to the decision model. A **decision model** is any method used for making a choice. Such models sometimes require elaborate quantitative procedures, such as a petroleum refinery's mathematical method for choosing what products to manufacture for any given day or week. A decision model, however, may also be simple. It may be confined to a single comparison of costs for choosing between two materials, as in the previous example of the tin versus aluminum cans. In this example, our decision model is to compare the predicted unit costs

and, assuming that everything else is equal, select the alternative with the lower cost.

Figure 1

Decision Process and Role of Information



The decision process in **Figure 1** applies to all business decisions, no matter how simple or complicated they may be. By using this process, you will be able to focus squarely on the relevant information—the predicted future differences between alternatives-in any decision.

In the rest of this chapter, we will use this decision process to apply the concept of relevance to several specific pricing decisions.

C.Accuracy and Relevance

In the best of all possible worlds, decision-making information would always be both perfectly relevant and precisely accurate. However, in reality, such information is often too difficult or too costly to obtain. Accountants are sometimes forced to choose between more relevance or more accuracy.

Precise but irrelevant information is worthless for decision making. For example, a university president's salary may be $450,000 per year, to the penny, but may have no bearing on the question of whether to buy or rent data-processing equipment. In contrast, imprecise but relevant information can be useful. For example, sales predictions for a new product may be subject to error, but they are still helpful in deciding whether to manufacture the product. Relevant information must be reasonably accurate but not precisely so.

The degree to which information is relevant or precise often depends on the degree to which it is qualitative or quantitative. Qualitative aspects are those for which measurement in financial terms is difficult and imprecise; quantitative aspects are those for which financial measurement is easy and precise. Accountants, statisticians, and mathematicians try to

express as many decision factors as feasible in quantitative terms. Why? Because this approach reduces the number of qualitative (subjective) factors they need to consider. Just as we noted that relevance is more crucial than precision in decision making, so may qualitative aspects dominate quantitative (financial) impacts in many decisions. For example, the extreme opposition of a militant labor union to new labor-saving machinery may cause a manager to forgo installation of such machinery even if it would reduce manufacturing costs. In a similar way, a company may pass up the opportunity to purchase a component from a supplier at a price below the cost of producing it themselves to avoid a long-range dependence on that particular supplier.

Likewise, managers sometimes introduce new technology (for example, advanced computer systems or automated equipment) even though the immediate quantitative results seem unattractive. Managers defend such decisions on the grounds that long-term financial results, although hard to predict, are likely to be improved by the technology.

2. The Relevance of Alternative Income Statements

In many cases, income statement information is relevant to decision making because it specifies how alternative choices impact income. Additionally, since executives use income statements to evaluate performance, managers need to know how their decisions will affect

reported income. There are different ways to organize income statement information. Some income statements track fixed and variable costs using the contribution approach, whereas others adopt the absorption approach used in reporting to external parties.

Let's examine the relevance of contribution and absorption income statements. To highlight the different effects of these approaches, consider the Cordell Company. Suppose Cordell produces and sells 1,000,000 units of seat covers for seats on airplanes, buses, and railroad passenger cars. Cordell sells these to companies such as US Airways and the Grand Canyon Railway Company. The total manufacturing cost of making 1,000,000 seat covers is $30,000,000. The unit manufacturing cost of the product is $30,000,000, 1,000,000, or $30 per unit. We will assume that in 20X1 the Cordell Company has direct-materials costs of $14 million, direct-labor costs of $6 million, indirect manufacturing costs as illustrated in figure 2 , selling and administrative expenses as illustrated in figure 3, and no beginning or ending inventories. Total sales are predicted at $40 million.

Note that figure 2 and 3 subdivide costs as variable or fixed. As explained next, most companies do not make such subdivisions in their absorption income statements for external reporting. However, many companies use such partitioning in contribution income statements to align with the information managers often use in decision making.

figure 2

Cordell Company Schedules of Predicted Indirect Manufacturing Costs for the Year Ended December 31, 20X1 (thousands of dollars)

Schedule 1: Variable Costs		
Supplies (lubricants, expendable tools, coolants, sandpaper)	$ 600	
Materials-handling labor (forklift operators)	2800	
Repairs on manufacturing equipment	400	
Power for factory	200	$ 4,000
Schedule 2: Fixed Costs		
Managers' salaries in factory	$ 400	
Factory employee training	180	
Factory picnic and holiday party	20	
Factory supervisory salaries	1,400	
Depreciation, plant, and equipment	3,600	
Property taxes on plant	300	
Insurance on plant	100	6,000
Total indirect manufacturing costs		$10,000

Figure 3

Cordell Company Schedules of Predicted Selling and Administrative Expenses for the Year Ended December 31, 20X1 (thousands of dollars)

Schedule 3: Selling Expenses		
Variable	$ 1,400	
Sales commissions	600	$ 2000
Shipping expenses for products sold		
Fixed		
Advertising	$ 1,400	
Sales salaries	2,000	
Other	600	4000
Total selling expenses		$ 6000
Schedule 4: Administrative Expenses		
Variable		
Some clerical wages	$ 160	
Computer time rented	40	$ 200
Fixed		
Office salaries	$ 200	
Other salaries	400	
Depreciation on office facilities	200	
Public-accounting fees	80	
Legal fees	200	
Other	720	1,800
Total administrative expenses		$ 2,000

A. Absorption Approach

Figure 4 presents Cordell's income statement using the **absorption approach** (or **absorption costing)**, the method used by companies for external financial reporting. Firms that take this approach consider all direct and indirect manufacturing costs (both variable and fixed) to be product (inventoriable) costs that become an expense in the form of manufacturing cost of goods sold only when the firm sells the related product.

Note that gross profit or gross margin is the difference between sales and the manufacturing cost of goods sold. Note too that the primary classifications of costs on the income statement are by three major management functions: manufacturing, selling, and administrative.

Figure 4

Cordell Company Predicted Absorption Income

Statement for the Year Ended December 31, 20X1 (thousands of dollars)

Sales……		$40,000
Less: Manufacturing cost of goods sold……		
Direct materials……..	$14,000	
Direct labor……	6,000	
Indirect manufacturing (Schedules 1 plus 2)*……...	10,000	30,000
Gross margin or gross profit……...		$ 10,000
Selling expenses (Schedule 3)……	$ 6,000	
Administrative expenses (Schedule 4)…….	2,000	
Total selling and administrative expenses…….		$ 8,000
Operating income……...		$ 2,000
*Schedules 1 and 2 are in **Figure 2**. Schedules 3 and 4 are in **Figure 3**.		

B. Contribution Approach

In contrast, **Figure 5** presents Cordell's income statement using the **contribution approach** (also called variable costing or direct costing). For decision purposes, the major difference between the contribution approach and the absorption approach is that the former emphasizes the distinction between variable and fixed costs. Its primary cost classification is by variable- and fixed-cost behavior patterns, not by business functions. Note that it is difficult to classify a given cost as variable, fixed, or mixed (for example, repairs), so often approximations must suffice.

The contribution income statement provides a contribution margin—revenue less all variable costs, including variable selling and administrative costs. This approach makes it easier to understand the impact of changes in sales volume on operating income.

Another major benefit of the contribution approach is that it stresses the role of fixed costs in operating income. Before a company can earn income, its total contribution margin must exceed the fixed costs it has incurred for manufacturing and other value-chain functions. This highlighting of contribution margin and total fixed costs focuses management attention on cost behavior and control in making both short-run and long-run decisions. Remember that advocates of the contribution approach do not maintain that fixed costs are unimportant or irrelevant.

They do stress, however, that the distinctions between behaviors of variable and fixed costs are crucial for certain decisions. Decisions usually affect fixed costs in a different way than they affect variable costs.

Figure 5

Cordell Company Predicted Contribution Income

Statement for the Year Ended December 31, 20X1 (thousands of dollars)

Sales…….		$40,000
Less: Variable expenses…….		
Direct materials……...	$14,000	
Direct labor…….	6,000	
Variable indirect manufacturing costs (Schedule 1)*…..	4,000	
Total variable manufacturing cost of goods sold……	$24,000	
Variable selling expenses (Schedule 3)……...	2,000	
Variable administrative expenses (Schedule 4)……...	200	
Total variable expenses……		$ 26,200
Contribution margin…….		**$ 13,800**
Less: Fixed expenses……		
Manufacturing (Schedule 2)……..	$ 6,000	
Selling (Schedule 3)……	4,000	
Administrative (Schedule 4)……	1,800	11,800
Operating income……..…….		$ 2,000

*Note: Schedules 1 and 2 are **Figure 2**. Schedules 3 and 4 are in **Figure 3**.

The distinction between the gross margin (from the absorption approach) and the contribution margin (from the contribution approach) is important, especially for manufacturing companies. Consider the following computations of contribution margin (CM) and gross margin (GM):

CM/unit = Price - (Variable manufacturing cost/unit + Variable selling & admin. cost/unit)

GM/unit = Price - (Variable manufacturing cost/unit + Fixed manufacturing cost/unit)

The variable selling and administrative cost per unit affects the contribution margin but not the gross margin, while the fixed manufacturing cost affects the gross margin but not the contribution margin. Because fixed manufacturing costs do not change with small changes in volume of units, it can be misleading to express such costs on a per unit basis. Thus, it can be misleading to use gross margin to predict the effect of changes in volume.

C. Comparing Contribution and Absorption Approaches

The contribution approach separates fixed costs from variable costs. It deducts variable costs from sales to compute a contribution margin and then deducts fixed costs to measure profit. In contrast, the absorption approach separates manufacturing costs from nonmanufacturing costs. It deducts manufacturing costs from sales to compute a gross margin and then deducts nonmanufacturing costs to measure profit. Both formats can be relevant for decision making, depending on the type of decision being contemplated. In situations where decisions affect variable costs differently than they affect fixed costs, such as the short-run pricing decisions we will discuss in this chapter, the contribution approach will yield great value. In contrast, the absorption approach is well suited for long-run pricing decisions, where it is important that the prices over a product's life cover all manufacturing costs, including fixed costs.

Regulators do not allow the contribution approach for external financial reporting. However, many companies use the contribution approach for internal decision-making purposes and an absorption format for external purposes. Why? Because they expect the benefits of making better decisions using the contribution approach to exceed the extra costs of using two different reporting systems simultaneously.

3. Pricing Special Sales Orders

Before considering more general approaches to pricing, it is helpful to examine how a manager might approach a specific pricing decision—whether to accept a special sales order. We will highlight the value of the contribution approach in such a decision.

- ✓ **Illustrative Example**

In our illustration, we'll focus again on the Cordell Company. Suppose **Branson Gray Line Tours** offered Cordell $26 per unit for a 100,000-unit special order of seat covers that (1) would not affect Cordell's regular business in any way, (2) would not affect total fixed costs, (3) would not require any additional variable selling and administrative expenses, (4) would use some otherwise idle manufacturing capacity, and (5) would not raise any antitrust issues concerning price discrimination. Should Cordell sell the 100,000 seat covers for the price of $26 each?

Perhaps we should state the question more precisely: What is the difference in the short-run financial results between not accepting and accepting the order? As usual, the key question is as follows: What are the differences between alternatives? **Figure 5** presents the income statement of the Cordell Company without the special order, using the contribution approach. Let's see how Cordell's operating income would change if it accepts the special order.

A. Correct Analysis-Focus on Relevant Information and Cost Behavior

The correct analysis focuses on determining relevant information and cost behavior. It employs the contribution-margin technique. As Exhibit 5-6 shows, this particular order affects only variable manufacturing costs, at a rate of $24 per unit. All other variable costs and all fixed costs are unaffected and, thus, irrelevant. Therefore, a manager may safely ignore them in making this special-order decision. Note how the distinction between variable- and fixed-cost behavior patterns in the contribution-margin technique aids the necessary cost analysis. Total short-run income will increase by $200,000 if Cordell accepts the order—despite the fact that the unit selling price of $26 is less than the total unit manufacturing cost of $30.

Figure 6

Cordell Company Comparative Predicted Income Statements, Contribution-Margin Technique for Year Ended December 31, 20X1

	Without Special Order 1,000,000 Units	Effect of Special Order, 100,000 Units		With Special Order, 1,100,000 Units
		Total	Per Unit	
Sales……..	$ 40,000,000	$ 2,600,000	$ 26	$42,600,000
Less: Variable expenses				
Manufacturing…….	$ 24,000,000	$2,400,000		$26,400,000
Selling and administrative.	2,200,000	-		2,200,000
Total variable expenses……	$ 26,200,000	$2,400,000	$24	$28,600,000
Contribution margin…….	$ 13,800,000	$ 200,000	$2	$14,000,000
Less: Fixed expenses				
Manufacturing……	$6,000,000	-	-	$6,000,000
Selling and administrative…	5,800,000	-	-	5,800,000
Total fixed expenses…….	$ 11,800,000	-	-	$11,800,000
Operating income…….	**$ 2,000,000**	**$200,000**	**$2**	**$2,200,000**

Why did we deduct fixed costs in **Figure 6**? After all, they are irrelevant because they do not differ across the alternatives considered in this decision. We included them because management often focuses on the bottom line-operating income. Both the contribution margin and the operating income increase by $200,000, so we could ignore the fixed costs and come to the same conclusion. However, management may prefer to see the effect of its decisions on operating income, so we include the irrelevant fixed costs in the presentation.

Note that our conclusion is that *short-run* income will increase by $200,000. In this example, we assumed that this special order would neither affect Cordell's regular business nor cause any additional fixed costs. These assumptions may be appropriate in the short run, but they may not hold in the long run. Accepting the special order may eventually affect sales to other customers, and it may at some time entail additional fixed costs for expanded capacity. If there are any expected long-run differences between accepting versus not accepting the special order, those differences should also be incorporated in the analysis.

B. Incorrect Analysis—Misuse of Unit Cost

Faulty cost analysis sometimes occurs because of misinterpreting unit fixed costs, especially with an absorption approach. For instance, Cordell's managers might erroneously use the $30 per unit total manufacturing cost under the absorption approach ($30,000,000, 1,000,000 units per **Figure 4**) to make the following prediction for the year:

Incorrect Analysis	**Without Special Order 1,000,000 Units**	**Incorrect Effect of Special Order 100,000 Units**	**With Special Order 1,100,000 Units**
Sales……..	$40,000,000	$2,600,000	$42,600,000
Less: Manufacturing cost of goods sold at $30……	30,000,000	3,000,000	33,000,000
Gross margin…….	10,000,000	(400,000)	9,600,000
Selling and administrative Expenses……..	8,000,000	-	8,000,000
Operating income……..	**$ 2,000,000**	**$ (400,000)**	**$ 1,600,000**

The incorrect prediction of a $3 million increase in costs results from multiplying 100,000 units by $30. The fallacy in this approach is that it treats a fixed cost (fixed manufacturing cost) as if it were variable. Avoid the mistake of using total unit costs as a basis for predicting how total costs will behave. Unit costs are useful for predicting variable costs, but can be misleading when used to predict fixed costs.

C.Confusion of Variable and Fixed Costs

Consider the relationship between total fixed manufacturing costs and a fixed manufacturing cost per unit of product:

$$\text{fixed manufacturing cost per unit of product} = \frac{\text{total fixed manufacturing costs}}{\text{some selected volume level as the denominator}} = \frac{\$6{,}000{,}000}{1{,}000{,}000 \text{ units}} = \$6 \text{ per unit}$$

For product-costing purposes, however, it is easy to misinterpret the fixed unit manufacturing cost-to act as if these fixed costs behave as if they are variable costs, which is contrary to fixed-cost behavior.

The addition of 100,000 units will not add any fixed costs as long as total output is within the relevant range. The incorrect analysis, however, includes 100,000 * $6 = $600,000 of additional fixed cost in the predictions of increases in total costs.

In short, we should compute the increase in manufacturing costs by multiplying 100,000 units by only the variable cost portion of cost, $24, not by $30. The $30 includes a $6 fixed-cost-per unit component that will not affect the total manufacturing costs as volume changes within the relevant range. Alternatively, one way to avoid this misinterpretation is to use the contribution approach, which does not unitize fixed costs, as illustrated in **Figure 6.**

Problems

1. Special Order

Consider the following details of the income statement of the McGregor Pen Company (MPC) for the year ended December 31, 20X0:

Sales……	$15,900,000
Less cost of goods sold…….	9,450,000
Gross margin or gross profit……...	$ 6,450,000
Less selling and administrative expenses…….	4,350,000
Operating income……..	$ 2,100,000

MPC's fixed manufacturing costs were $3.6 million and its fixed selling and administrative costs were $3.3 million. Sales commissions of 3% of sales are included in selling and administrative expenses.

The division had produced and sold 3 million pens. Near the end of the year, **Pizza Hut** offered to buy 140,000 pens on a special order. To fill the order, a special Pizza Hut logo would have to be added to each pen. Pizza Hut intended to use the pens for special promotions in an eastern city during early 20X1.

Even though MPC had some idle plant capacity, the president rejected the Pizza Hut offer of $610,400 for the 140,000 pens. He said, *The Pizza Hut offer is too low. We'd avoid paying sales commissions, but we'd have to incur an extra cost of $.35 per pen to add the logo. If MPC sells below its regular selling prices, it will begin a chain reaction of competitors' price cutting and of customers wanting special deals. I believe in pricing at no*

lower than 8% above our full costs of $13,800,000 , 3,000,000 units = $4.60 per unit plus the extra $.35 per pen less the savings in commissions.

Required:

A. Using the contribution-margin technique, prepare an analysis similar to that in figure 6 on page 98 . Use four columns: without the special order, the effect of the special order (one column total and one column per unit), and totals with the special order.

B. By what percentage would operating income increase or decrease if the order had been accepted? Do you agree with the president's decision? Why?

2. Contribution and Absorption Income Statements

The following information is taken from the records of the Zealand Manufacturing Company for the year ending December 31, 2012. There were no beginning or ending inventories.

Sales	$14,000,000	Long-term rent, factory	$ 85,000
Sales commissions	470,000	Factory superintendent's salary	31,000
Advertising	430,000	Factory supervisors' salaries	105,000
Shipping expenses	320,000	Direct materials used	3,500,000
Administrative executive salaries	100,000	Direct labor	1,700,000
Administrative clerical salaries (variable)	370,000	Cutting bits used	53,000
Fire insurance on factory equipment	4,000	Factory methods research	42,000
Property taxes on factory equipment	26,000	Abrasives for machining	99,000
Indirect labor	950,000	Depreciation on factory equipment	430,000

Required:

A. Prepare a contribution income statement and an absorption income statement. If you are in doubt about any cost behavior pattern, decide on the basis of whether the total cost in question will fluctuate substantially over a wide range of volume. Prepare a separate supporting schedule of indirect manufacturing costs subdivided between variable and fixed costs.

B. Suppose that all variable costs fluctuate directly in proportion to sales, and that fixed costs are unaffected over a wide range of sales. What would operating income have been if sales had been $12 million instead of $14 million? Which income statement did you use to help get your answer? Why?

3. Straightforward Absorption Statement

The Kerwin Company had the following data (in thousands) for a given period:

Sales…….	$780
Direct materials……...	180
Direct labor……..	230
Indirect manufacturing costs…….	310
Selling and administrative expenses…….	130

There were no beginning or ending inventories.

Required:

Compute the (1) manufacturing cost of goods sold, (2) gross profit, (3) operating income, and (4) conversion cost (total manufacturing cost less materials cost).

4. Straightforward Contribution Income Statement

Masa, Ltd., had the following data (in millions of yen) for a given period:

Sales……..	$ 990
Direct materials…….	250
Direct labor……	140
Variable factory overhead……	65
Variable selling and administrative expenses……..	115
Fixed factory overhead…….	110
Fixed selling and administrative expenses……	75

There were no beginning or ending inventories.

Required:

Compute the (a) variable manufacturing cost of goods sold, (b) contribution margin, and (c) operating income.

5. Straightforward Absorption and Contribution Statement

Anzola Company had the following data (in millions) for a recent period. Fill in the blanks. There were no beginning or ending inventories.

a. Sales…….	$ 920
b. Direct materials used……	350
c. Direct labor……..	210
Indirect manufacturing costs:	
d. Variable…….	100
e. Fixed……	50
f. Variable manufacturing cost of goods sold…….	?
g. Manufacturing cost of goods sold……	?
Selling and administrative expenses:……	
h. Variable……..	90
i. Fixed……...	80
j. Gross profit…….	?
k. Contribution margin……..	?

6. Contribution Income Statement

Spadoni Company had the following data (in thousands) for a given period. Assume there are no inventories.

Direct labor……	165
Direct materials……..	160
Variable indirect manufacturing…….	100
Contribution margin……..	185
Fixed selling and administrative expenses……	105
Operating income…….	45
Sales……..	855

Required:

Compute the (a) variable manufacturing cost of goods sold, (b) variable selling and administrative expenses, and (c) fixed indirect manufacturing costs.

7. Special-Order Decision

Belltown Athletic Supply (BAS) makes game jerseys for athletic teams. The F. C. Kitsap soccer club has offered to buy 100 jerseys for the teams in its league for $15 per jersey. The team price for such jerseys normally is $18, an 80% markup over BAS's purchase price of $10 per jersey. BAS adds a name and number to each jersey at a variable cost of $2 per jersey. The annual fixed cost of equipment used in the printing process is $6,000, and other fixed costs allocated to jerseys are $2,000. BAS makes about 2,000 jerseys per year, so the fixed cost is $4 per jersey. The equipment is used only for printing jerseys and stands idle 75% of the usable time.

The manager of BAS turned down the offer, saying, "If we sell at $15 and our cost is $16, we lose money on each jersey we sell. We would like to help your league, but we can't afford to lose money on the sale."

Required:

A. Compute the amount by which the operating income of BAS would change if it accepted F. C. Kitsap's offer.

B. Suppose you were the manager of BAS. Would you accept the offer? In addition to considering the quantitative impact computed in requirement 1, list two qualitative considerations that would influence your decision-one qualitative factor supporting acceptance of the offer and one supporting rejection.

8. Variety of Cost Terms

Consider the following data:

Variable selling and administrative costs per unit…….	$ 7.00
Total fixed selling and administrative costs……..	$810,000
Total fixed manufacturing costs……..	$500,000
Variable manufacturing costs per unit……	$ 12.00
Units produced and sold……..	100,000

Required:

Compute the following per unit of product: (a) total variable costs, (b) full manufacturing cost, (c) full cost.

9. Acceptance of Low Bid

The Velasquez Company, a maker of a variety of metal and plastic products, is in the midst of a business downturn and is saddled with many idle facilities. Columbia Health Care has approached Velasquez to produce 300,000 non slide serving trays. Columbia will pay $1.50 each.

Velasquez predicts that its variable costs will be $1.60 each. Its fi xed costs, which had been averaging $1 per unit on a variety of other products, will now be spread over twice as much volume. The president commented, "Sure we'll lose $.10 each on the variable costs, but we'll gain $.50 per unit by spreading our fixed costs. Therefore, we should take the offer because it represents an advantage of $.40 per unit."

Suppose the regular business had a current volume of 300,000 units, sales of $600,000, variable costs of $480,000, and fixed costs of $300,000. Do you agree with the president? Why?

10. Pricing by Auto Dealer

Many automobile dealers have an operating pattern similar to that of Austin Motors, a dealer in Texas. Each month, Austin initially aims at a unit volume quota that approximates a break-even point. Until the break-even point is reached, Austin has a policy of relatively lofty pricing, whereby the "minimum deal" must contain a sufficiently high markup to ensure a contribution to profit of no less than $400. After the break-even

point is attained, Austin tends to quote lower prices for the remainder of the month.

Required:

What is your opinion of this policy? As a prospective customer, how would you react to this policy?

11. Target Selling Prices

Consider the following data from Henderson Company's budgeted income statement (in thousands of dollars):

Target sales……..	$96,750
Variable costs:	
Manufacturing……..	32,250
Selling and administrative…….	6,450
Total variable costs……..	38,700
Fixed costs:	
Manufacturing…….	8,600
Selling and administrative……...	6,450
Total fixed costs……..	15,050
Total of all costs…….	53,750
Operating income……	$43,000

Required:

Compute the following markup percentages that would be used for obtaining the same target sales as a percentage of (1) total variable costs, (2) full costs, and (3) variable manufacturing costs.

12. Competitive Bids

Griffy, Rodriguez, and Martinez, a CPA firm, is preparing to bid for a consulting job. Although Alicia Martinez will use her judgment about the market in finalizing the bid, she has asked you to prepare a cost analysis to help in the bidding. You have estimated the costs for the consulting job to be as follows:

Materials and supplies, at cost……...	$ 30,000
Hourly pay for consultants, 2,000 hours at $35 per hour……	70,000
Fringe benefits for consultants, 2,000 hours at $12 per hour……..	24,000
Total variable cost…….	$124,000
Fixed costs allocated to the job Based on labor, 2,000 hours at $10 per hour…….	20,000
Based on materials and supplies, 80% of 30,000……..	24,000
Total cost……...	$168,000

Of the $44,000 allocated fixed costs, $35,000 will be incurred even if the job is not undertaken. Alicia normally bids jobs at the sum of (1) 150% of the estimated materials and supplies cost and (2) $75 per estimated labor hour.

Required:

A. Prepare a bid using the normal formula.

B. Prepare a minimum bid equal to the additional costs expected to be incurred to complete the job.

C. Prepare a bid that will cover full costs plus a markup for profit equal to 20% of full cost.

13. Target Costing

Premium Corporation believes that there is a market for a portable electronic toothbrush that can be easily carried by business travelers. Premium's market research department has surveyed the features and prices of electronic brushes currently on the market. Based on this research, Premium believes that $75 would be about the right price. At this price, marketing believes that about 78,000 new portable brushes can be sold over the product's life cycle. It will cost about $1,170,000 to design and develop the portable brush. Premium has a target profit of 25% of sales.

Required:

Determine the total and unit target cost to manufacture, sell, distribute, and service the portable brushes.

14. Pricing and Contribution-Margin Technique

The Transnational Trucking Company has the following operating results to date for 20X1:

Operating Revenues……	$50,000,000
Operating Costs……..	40,000,000
Operating Income……..	$10,000,000

A large Boston manufacturer has inquired about whether Transnational would be interested in trucking a large order of its parts to Chicago. Steve Goldmark, operations manager, investigated the situation and estimated that the "fully allocated" costs of servicing the order would be $45,000. Using

his general pricing formula, he quoted a price of $50,000. The manufacturer replied, “We’ll give you $39,000, take it or leave it. If you do not want our business, we’ll truck it ourselves or go elsewhere.”

A cost analyst had recently been conducting studies of how Transnational’s operating costs tended to behave. She found that $30 million of the $40 million could be characterized as variable costs. Goldmark discussed the matter with her and decided that this order would probably generate cost behavior about the same as Transnational’s general operations.

Required:

A. Using a contribution-margin technique, prepare an analysis for Transnational.

B. Should Transnational accept the order? Explain.

15. Cost Analysis and Pricing

The budget for the Oxford University Printing Company for 20X1 follows:

Sales……		£1,128,600
Direct material……	£295,000	
Direct labor……	340,000	
Overhead…….	391,000	1,026,000
Net income……..		£ 102,600

The company typically uses a so-called cost-plus pricing system. Direct-material and direct-labor costs are computed, overhead is added at a rate of 115% of direct-labor costs, and 10% of the total cost is added to obtain the selling price.

Edith Smythe, the sales manager, has placed a £23,000 bid on a particularly large order with a cost of £5,300 direct material and £6,200 direct labor. The customer informs her that she can have the business for £16,000, take it or leave it. If Smythe accepts the order, total sales for 20X1 will be £1,144,600. Smythe refuses the order, saying, "I sell on a cost-plus basis. It is bad policy to accept orders at below cost. I would lose £2,630 on the job." The company's annual fixed overhead is £170,000.

Required:

A. What would operating income have been with the order? Without the order? Show your computations.

B. Give a short description of a contribution-margin technique to pricing that Smythe might follow to achieve a price of £23,000 on the order.

16. Effects of Volume on Operating Income

The Hester Division of Melbourne Sports Company manufactures boomerangs, which are sold to wholesalers and retailers. The division manager has set a target of 220,000 boomerangs for next month's production and sales has developed an accurate budget for that level of sales. The manager has also prepared an analysis of the effects on operating income of deviations from the target:

Volume in units……	170,000	220,000	260,000
Sales at $3.20…….	$544,000	$704,000	$832,000
Full costs at $2.10……	357,000	462,000	546,000
Operating income…….	$187,000	$242,000	$286,000

The costs have the following characteristics: Variable manufacturing costs are $.85 per boomerang; variable selling costs are $.65 per boomerang; fixed manufacturing costs per month are $109,000; and fixed selling and administrative costs per month are $23,000.

Required:

A. Prepare a correct analysis of the changes in volume on operating income. Prepare a tabulated set of income statements at levels of 170,000, 220,000, and 260,000 boomerangs. Also show percentages of operating income in relation to sales.

B. Compare your tabulation with the manager's tabulation. Why is the manager's tabulation incorrect?

17. Pricing of Special Order

The Drosselmeier Corporation, located in Munich, makes Christmas nutcrackers and has an annual plant capacity of 2,400 product units. Suppose its predicted operating results (in euros) for the year are as follows:

Production and sales of 2,000 units, total sales……	€180,000
Manufacturing costs	
Fixed (total)…….	70,000
Variable (per unit)……...	25
Selling and administrative expenses	
Fixed (total)……	30,000
Variable (per unit)……..	10

Required:

Compute the following, ignoring income taxes:

A. If the company accepts a special order for 300 units at a selling price of €40 each, how would the total predicted net income for the year be affected, assuming no effect on regular sales at regular prices?

B. Without decreasing its total net income, what is the lowest unit price for which the Drosselmeier Corporation could sell an additional 100 units not subject to any variable selling and administrative expenses, assuming no effect on regular sales at regular prices?

C. List the numbers given in the problem that are irrelevant (not relevant) in solving number 2.

D. Compute the expected annual net income (with no special orders) if plant capacity can be doubled by adding additional facilities at a cost

of €500,000. Assume that these facilities have an estimated life of 4 years with no residual scrap value, and that the current unit selling price can be maintained for all sales. Total sales are expected to equal the new total plant capacity each year. No changes are expected in variable costs per unit or in total fixed costs except for depreciation.

Bubble Answer Sheet

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1. Ⓐ Ⓑ Ⓒ Ⓓ	18. Ⓐ Ⓑ Ⓒ Ⓓ	35. Ⓐ Ⓑ Ⓒ Ⓓ
2. Ⓐ Ⓑ Ⓒ Ⓓ	19. Ⓐ Ⓑ Ⓒ Ⓓ	36. Ⓐ Ⓑ Ⓒ Ⓓ
3. Ⓐ Ⓑ Ⓒ Ⓓ	20. Ⓐ Ⓑ Ⓒ Ⓓ	37. Ⓐ Ⓑ Ⓒ Ⓓ
4. Ⓐ Ⓑ Ⓒ Ⓓ	21. Ⓐ Ⓑ Ⓒ Ⓓ	38. Ⓐ Ⓑ Ⓒ Ⓓ
5. Ⓐ Ⓑ Ⓒ Ⓓ	22. Ⓐ Ⓑ Ⓒ Ⓓ	39. Ⓐ Ⓑ Ⓒ Ⓓ
6. Ⓐ Ⓑ Ⓒ Ⓓ	23. Ⓐ Ⓑ Ⓒ Ⓓ	40. Ⓐ Ⓑ Ⓒ Ⓓ
7. Ⓐ Ⓑ Ⓒ Ⓓ	24. Ⓐ Ⓑ Ⓒ Ⓓ	41. Ⓐ Ⓑ Ⓒ Ⓓ
8. Ⓐ Ⓑ Ⓒ Ⓓ	25. Ⓐ Ⓑ Ⓒ Ⓓ	42. Ⓐ Ⓑ Ⓒ Ⓓ
9. Ⓐ Ⓑ Ⓒ Ⓓ	26. Ⓐ Ⓑ Ⓒ Ⓓ	43. Ⓐ Ⓑ Ⓒ Ⓓ
10. Ⓐ Ⓑ Ⓒ Ⓓ	27. Ⓐ Ⓑ Ⓒ Ⓓ	44. Ⓐ Ⓑ Ⓒ Ⓓ
11. Ⓐ Ⓑ Ⓒ Ⓓ	28. Ⓐ Ⓑ Ⓒ Ⓓ	45. Ⓐ Ⓑ Ⓒ Ⓓ
12. Ⓐ Ⓑ Ⓒ Ⓓ	29. Ⓐ Ⓑ Ⓒ Ⓓ	46. Ⓐ Ⓑ Ⓒ Ⓓ
13. Ⓐ Ⓑ Ⓒ Ⓓ	30. Ⓐ Ⓑ Ⓒ Ⓓ	47. Ⓐ Ⓑ Ⓒ Ⓓ
14. Ⓐ Ⓑ Ⓒ Ⓓ	31. Ⓐ Ⓑ Ⓒ Ⓓ	48. Ⓐ Ⓑ Ⓒ Ⓓ
15. Ⓐ Ⓑ Ⓒ Ⓓ	32. Ⓐ Ⓑ Ⓒ Ⓓ	49. Ⓐ Ⓑ Ⓒ Ⓓ
16. Ⓐ Ⓑ Ⓒ Ⓓ	33. Ⓐ Ⓑ Ⓒ Ⓓ	50. Ⓐ Ⓑ Ⓒ Ⓓ
17. Ⓐ Ⓑ Ⓒ Ⓓ	34. Ⓐ Ⓑ Ⓒ Ⓓ	

Bubble Answer Sheet

(A) (B) (C) (D)

1. (A) (B) (C) (D)	18. (A) (B) (C) (D)	35. (A) (B) (C) (D)
2. (A) (B) (C) (D)	19. (A) (B) (C) (D)	36. (A) (B) (C) (D)
3. (A) (B) (C) (D)	20. (A) (B) (C) (D)	37. (A) (B) (C) (D)
4. (A) (B) (C) (D)	21. (A) (B) (C) (D)	38. (A) (B) (C) (D)
5. (A) (B) (C) (D)	22. (A) (B) (C) (D)	39. (A) (B) (C) (D)
6. (A) (B) (C) (D)	23. (A) (B) (C) (D)	40. (A) (B) (C) (D)
7. (A) (B) (C) (D)	24. (A) (B) (C) (D)	41. (A) (B) (C) (D)
8. (A) (B) (C) (D)	25. (A) (B) (C) (D)	42. (A) (B) (C) (D)
9. (A) (B) (C) (D)	26. (A) (B) (C) (D)	43. (A) (B) (C) (D)
10. (A) (B) (C) (D)	27. (A) (B) (C) (D)	44. (A) (B) (C) (D)
11. (A) (B) (C) (D)	28. (A) (B) (C) (D)	45. (A) (B) (C) (D)
12. (A) (B) (C) (D)	29. (A) (B) (C) (D)	46. (A) (B) (C) (D)
13. (A) (B) (C) (D)	30. (A) (B) (C) (D)	47. (A) (B) (C) (D)
14. (A) (B) (C) (D)	31. (A) (B) (C) (D)	48. (A) (B) (C) (D)
15. (A) (B) (C) (D)	32. (A) (B) (C) (D)	49. (A) (B) (C) (D)
16. (A) (B) (C) (D)	33. (A) (B) (C) (D)	50. (A) (B) (C) (D)
17. (A) (B) (C) (D)	34. (A) (B) (C) (D)	

Chapter (4)

Relevant Information for Decision Making with a Focus on Operational Decisions

Chapter (4)

Relevant Information for Decision Making with a Focus on Operational Decisions

1. Introduction:

In this chapter, we examine relevance in the operational area. The basic framework for identifying relevant information remains the same for operations as it was for pricing. We are still looking only for future costs that differ among alternatives. However, we now expand our analysis by introducing the concepts of opportunity costs and differential costs.

2. Analyzing Relevant Information: Focusing on the Future and Differential Attributes

A. Opportunity, Outlay, and Differential Costs and Analysis

Management decision making is a matter of comparing two or more alternative courses of action. suppose a manager has only two alternatives to compare. The key to determining the financial difference between the alternatives is to identify the differential costs and revenues. **Differential cost** (**differential revenue)** is the difference in total cost (revenue) between two alternatives. For example, consider the decision about which of two machines to purchase. Both machines perform the same function. The differential cost is the difference in the price paid for the machines plus the

difference in the costs of operating the machines. We call a decision process that compares the differential revenues and costs of alternatives a **differential analysis.**

When managers analyze the differential costs between the existing situation and a proposed alternative, they often refer to this as **incremental analysis.** They examine the incremental (additional) costs and benefits of the proposed alternative compared with the current situation. The **incremental costs** are additional costs or reduced revenues generated by the proposed alternative. **Incremental benefits** are the additional revenues or reduced costs generated by the proposed alternative. For instance, suppose **Nantucket Nectars** proposes to increase production of its NectarFizz juice drink from 1,000 bottles to 1,200 bottles per week. The incremental costs of the proposed alternative are the costs of producing the additional 200 bottles each week. The incremental benefits are the additional revenues generated by selling the extra 200 bottles.

When there are multiple alternative courses of action, managers often compare one particular action against the entire set of alternatives. Let's consider another example. Nantucket Nectars proposes introducing a new 100% juice drink, Papaya Mango, which requires the use of a machine that is currently sitting idle. Nantucket Nectars can sell the Papaya Mango produced over the remaining life of the machine for $500,000. In addition,

the company will incur **outlay costs** - costs that require a future cash disbursement to purchase needed resources - of $400,000, producing a net financial benefit of $100,000.

Nantucket Nectars purchased the machine for $100,000 several years ago, but we know that the $100,000 paid for the machine is not relevant. Why? Because , as we learned from our discussion of relevant costs in , it is not a future cost nor does it differ across the alternatives. But what if the machine can be used for alternatives other than producing Papaya Mango? To decide whether to use the machine to produce Papaya Mango, the company needs to compare the benefit of using the machine for Papaya Mango against the other alternative uses of the machine. Suppose there are two alternative uses, 1) selling the machine for $50,000 and 2) using it to produce additional bottles of Original Peach juice, which would generate revenues less outlay costs of $60,000. Using an incremental approach, we compare the revenues and outlay costs of the proposed alternative, producing Papaya Mango, to those of the other alternative uses of the machine. In this case, the revenue less outlay costs for Papaya Mango is $100,000, for Original Peach is $60,000, and for selling the machine is $50,000. Thus, the result of the incremental analysis shows that producing Papaya Mango is $40,000 better than the next best alternative use of the machine.

If there are many alternative uses of the machine, incremental analysis can become cumber-some. In such a case, Nantucket Nectars could use an alternative approach using opportunity costs. Opportunity cost applies to a resource that a company already owns, so its use requires no additional cash disbursement. We define **opportunity cost** as the maximum available benefit forgone (or passed up) by using a resource a company already owns for a particular purpose instead of using it in the best alternative use.

In our example, there are only two alternative uses of the machine, selling it or using it to produce extra Original Peach. Using the machine to produce Papaya Mango requires Nantucket Nectars to forgo selling the machine for $50,000 and also to forgo using it for Original Peach and generating $60,000 of benefit. The best alternative use is producing Original Peach, so the opportunity cost of the machine is $60,000.

Using opportunity costs, we can compute the net financial benefit of producing Papaya Mango:

Revenues……	$500,000
Costs:	
Outlay costs……	400,000
Financial benefit before opportunity costs……	$100,000
Opportunity cost of machine……..	60,000
Net financial benefit	**$ 40,000**

Nantucket Nectars will gain $40,000 more financial benefit using the machine to make Papaya Mango than it would gain using it for the next most profitable alternative. This is equivalent to the result using incremental analysis.

To further illustrate this equivalence, consider Maria Morales, a certified public accountant employed by a large accounting firm for a salary of $60,000 per year. She is considering an alternative use of her time, her most valuable resource. The alternative is to start an independent accounting practice. Maria's practice would have revenues of $200,000. This is $140,000 more than she would make as an employee of the large firm. However, she would also have to pay $120,000 to rent office space, lease equipment, buy advertising, and cover other out-of-pocket expenses.

- **An incremental analysis follows:**

Assume Maria Opens Her Own Independent Practice

Incremental benefits, $200,000 - $60,000 of increased revenues……..	$140,000
Incremental costs, $120,000 - $0 of additional costs……..	120,000
Incremental income effects per year……	$20,000

If Maria opens her own practice, her income will be $20,000 higher than it is as an employee of the large firm.

Now let's take an opportunity-cost approach. We will look at the alternative of operating an independent practice, essentially comparing it to the alternative uses of Maria's time (which in this case is simply the alternative of working for the large firm). To do this we must consider another cost. Had Maria remained an employee, she would have made $60,000. By starting her own company, Maria will forgo this profit. Thus, the $60,000 is an opportunity cost of starting her own business:

- **Alternative Chosen: Independent Practice**

Revenue……		$200,000
Expenses……		
Outlay costs (operating expenses)……	$120,000	
Opportunity cost of employee salary…….	60,000	180,000
Income effects per year……		$ 20,000

Consider the two preceding tabulations. Each produces the correct key difference between alternatives, $20,000 per year. The first tabulation does not mention opportunity cost because we measured the differential economic impacts-differential revenues and differential costs- compared to the alternative. The second tabulation mentions opportunity cost because we included the $60,000 annual net economic impact of the excluded alternative as a cost of the chosen alternative. If we had failed to recognize opportunity cost in the second tabulation, we would have misstated the difference between the alternatives.

Why do we use opportunity costs when an incremental analysis produces the same result? When there is only one resource and one alternative opportunity to use that resource, the incremental analysis is more straightforward. However, suppose you were analyzing a project that uses five existing machines each with 10 alternative uses. An incremental analysis would require comparing the project with 10^5 = 100,000 alternatives—every combination of alternative uses of the five machines. Using opportunity costs allows you to simplify the analysis. You just assess the 10 alternatives for each machine, pick the best one to use in determining each machine's opportunity cost, and add the five opportunity costs to the outlay costs of the project. The opportunity- cost approach is simpler than the incremental approach in such a situation.

This does not mean that estimating opportunity costs is easy. They depend on estimated revenues and costs for hypothetical alternatives-alternatives not taken. Furthermore, they depend on the alternatives that are available at a particular point in time. The same alternatives may not be available at a different time. For example, excess capacity in September does not mean that there will also be excess capacity in October. Finally, there is little historical information-sale or purchase prices-to help predict benefits for hypothetical alternatives.

We will next use the concepts in this section to analyze a variety of operational decisions. Just as we focused on relevant costs for pricing decisions in Chapter 3 , we will focus on relevant costs for operational decisions in this chapter.

B. Make-or-Buy Decisions

Managers often must decide whether to produce a product or service within the firm or purchase it from an outside supplier. If they purchase products or services from an outside supplier, we often call it **outsourcing.** Managers apply relevant-cost analysis to a variety of outsourcing decisions such as the following:

- **Boeing** must decide whether to buy or make many of the tools used in assembling 787 airplanes.
- **Wells Fargo** must decide whether to operate its own call center or buy services from a call center in India.
- **Apple** must decide whether to develop its own Internet search software for a new computer or to buy it from a software vendor.

The Business First box on page 230 describes outsourcing and its growing popularity.

C.Basic Make-or-Buy Decisions and Idle Facilities

A basic make-or-buy question is whether a company should make its own parts that it will use in its final products or buy the parts from vendors. Sometimes the answer to this question is based on qualitative factors. For example, some manufacturers always make parts because they want to control quality. Alternatively, some companies always purchase parts to protect long-run relationships with their suppliers. These companies may deliberately buy from vendors even during slack times to avoid difficulties in obtaining needed parts during boom times when there may be shortages of materials and workers, but no shortage of sales orders.

What quantitative factors are relevant to the decision of whether to make or buy? The answer, again, depends on the situation. A key factor is whether there are idle facilities. Many companies make parts when they cannot use their facilities to better advantage.

Assume that **Nantucket Nectars** reports the following costs:

Nantucket Nectars Company Cost of Making 12-Ounce Glass Bottles

	Total Cost for 1,000,000 Bottles	**Cost per Bottle**
Direct materials……..	$ 60,000	$0.06
Direct labor…….	20,000	0.02
Variable factory overhead…….	40,000	0.04
Fixed factory overhead……	80,000	0.08
Total costs……	$200,000	$0.20

Another manufacturer offers to sell Nantucket Nectars the bottles for $0.18. Should Nantucket Nectars make or buy the bottles?

Although the $.20/unit in-house cost seemingly indicates that the company should buy, the answer may be more complicated. The essential question is "What is the difference in expected future costs between the alternatives?" Suppose the $.08 fixed overhead per bottle consists of costs that will continue regardless of the decision, such as depreciation, property taxes, insurance, and foreman salaries for the plant. In that case, the entire $0.08 becomes irrelevant.

Are the fixed costs always irrelevant? No. Suppose instead Nantucket Nectars will eliminate $50,000 of the fixed costs if the company buys the bottles instead of making them. For example, the company may be able to release a supervisor with a $50,000 salary. In that case, the fixed costs that the company will be able to avoid in the future are relevant.

For the moment, suppose the capacity now used to make bottles will become idle if the company purchases the bottles. Further, the $50,000 supervisor's salary is the only fixed cost that the company would eliminate. The relevant computations follow:

	Make		Buy	
	Total	**Per Bottle**	**Total**	**Per Bottle**
Purchase cost…….			$180,000	$0.18
Direct materials…….	$ 60,000	$0.06		
Direct labor……	20,000	0.02		
Variable factory overhead…….	40,000	0.04		
Fixed factory overhead that can be avoided by not making (supervisor's salary)……	50,000 *	0.05*		
Total relevant costs……	$170,000	$0.17	$180,000	$0.18
Difference in favor of making……..	$ 10,000		$0.01	

*Note that unavoidable fixed costs of $80,000 - $50,000 = $30,000 are irrelevant. Thus, the irrelevant costs per unit are $.08 - $0.05 = $0.03.

The key to optimal make-or-buy decisions is identifying and accurately measuring the additional costs for making (or the costs avoided by buying) a part or component.

D.Make or Buy and the Use of Facilities

Make-or-buy decisions are rarely as simple as the one in our Nantucket Nectars example. As we said earlier, the use of facilities is a key to the make-or-buy decision. For simplicity, we assumed that the Nantucket Nectars facilities would remain idle if the company chose to buy the bottles. This implies the opportunity cost of the facilities is zero. In most cases, it is not optimal for companies to leave their facilities idle. Instead, they will often put idle facilities to some other use, and we must consider the financial outcomes of these uses when choosing to make or buy. The value received from the best of these alternative uses is an opportunity cost for the internal production of the parts or components.

Suppose Nantucket Nectars can use the released facilities in our example in some other manufacturing activity that generates additional contribution margin of $55,000, or can rent them out for $25,000. We now have four alternatives to consider. The following table is an incremental analysis that summarizes all the costs and revenues that differ among the four alternatives (amounts are in thousands):

	Make	**Buy and Leave Facilities Idle**	**Buy and Rent Out Facilities**	**Buy and Use Facilities for Other Products**
Rent revenue	$ —	$ —	$ 25	$ —
Additional contribution margin from other products	-	-	-	55
Relevant cost of bottles	(170)	(180)	(180)	(180)
Net relevant costs	$(170)	$(180)	$(155)	$(125)

The final column indicates that buying the bottles and using the vacated facilities for the production of other products would yield the lowest net costs in this case, $170,000 - $125,000 = $45,000 less than the cost of making the bottles. Alternatively, we can analyze this choice using opportunity costs. The opportunity cost of the facilities is $55,000 because that is the maximum benefit Nantucket Nectars could get if it did not use the facilities to make bottles. Add that to the outlay cost, and the total cost of making the bottles is $225,000. This is $45,000 higher than the $180,000 cost of purchasing the bottles.

3. Deletion or Addition of Products, Services, or Departments

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

A. Avoidable and Unavoidable Costs

Often, existing businesses consider expanding or contracting their operations to improve profitability. Decisions to add or to drop products, or to add or drop departments use the same analysis: examining all the relevant costs and revenues. For example, consider a store that has three major departments: groceries, general merchandise, and drugs. Management is considering dropping the grocery department, which has consistently shown an operating loss. The following table reports the store's annual operating income (in thousands of dollars):

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

*Examples of variable expenses include product, paper shopping bags, and sales commissions.

Notice that we have divided the fixed expenses into two categories, avoidable and unavoidable. **Avoidable costs** -costs that will not continue if an ongoing operation is changed or deleted-are relevant. In our example, avoidable costs include department salaries and other costs that the store could eliminate by not operating the specific department. **Unavoidable costs** -costs that continue even if a company discontinues an operation-are not relevant in our example because a decision to delete the department does not affect them.

Unavoidable costs include many **common costs,** which are those costs of facilities and services that are shared by users. For example, store depreciation, heating, air conditioning, and general management expenses are costs of shared resources used by all departments. For our example, assume first that we will consider only two alternatives, dropping or continuing the grocery department, which shows a loss of $10,000. Assume further that the decision will not affect the total assets invested in the store. The vacated space would be idle, and the unavoidable costs would continue. Which alternative would you recommend? An analysis (in thousands of dollars) follows:

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

The preceding analysis shows that operating income would be worse, rather than better, if the store drops the groceries department and leaves the vacated facilities idle. In short, groceries bring in a contribution margin of $200,000, which is $50,000 more than the $150,000 fixed expenses the store would save by closing the grocery department. The grocery department showed a loss in the first income statement because of the unavoidable fixed costs charged (allocated) to it, and these costs will not be eliminated when the grocery department is dropped.

Most companies do not like having space left idle, so perhaps the preceding example was a bit too basic. Assume now that the store could use the space made available by dropping the groceries department to expand the general merchandise department. The space would be occupied by

merchandise that would increase sales by $500,000, generate a 30% contribution-margin percentage, and have additional (avoidable) fixed costs of $70,000. The $80,000 increase in operating income of general merchandise more than offsets the $50,000 decline from eliminating groceries, providing an overall increase in operating income of $65,000 - $35,000 = $30,000. The analysis is as follows:

Effects of Changes				
	Total Before Change (a)	Drop Groceries (b)	Expand General Merchandise (c)	Total After Changes (a) - (b) + (c)
(In thousands of dollars)				
Sales…….	$1,900	$1,000	$500	$1,400
Variable expenses…….	1,420	800	350	970
Contribution margin……	$ 480	$ 200	$150	$ 430
Avoidable fixed expenses	265	150	70	185
Contribution to common space and other unavoidable costs	$ 215	$ 50	$ 80	$ 245
Common space and other unavoidable costs*……..	180	-	-	180
Operating income……	$ 35	$ 50	$ 80	$ 65
*Includes the $60,000 of former grocery fixed costs, which were allocations of unavoidable common costs that will continue regardless of how the space is occupied.				

This example illustrates that relevant costs are not always variable. The key to decision making is not relying on a hard and fast rule about what to include and what to ignore. Rather, you need to analyze all pertinent costs and revenues to determine what is and what is not relevant in the specific context. In this case, the relevant costs included the avoidable fixed costs.

It is also important to remember that nonfinancial information can influence decisions to add or delete products or departments. For example, when deciding to delete a product or to close a plant, there are ethical considerations. What happens to the employees in the area being discontinued? What about customers who might be relying on customer support in the future? What about the community in which a discontinued operation is located? Although the nonfinancial impacts of such considerations are hard to determine, they must be considered. This may be a situation where good ethics is good business, as a stable, committed workforce and a supportive community can be important assets to a company. Additionally, negative impacts on employees, customers, or communities could create future financial problems for the company that is much larger than short-term cost savings from discontinuing a product or plant.

4. Joint Product Costs: Sell or Process Further Decisions

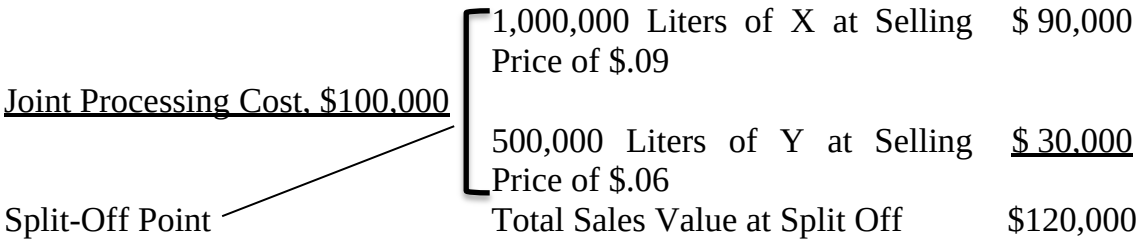
We now examine another operating decision for which relevant costs are important-decisions about whether to sell a product as is or to further process it. In this section, we will examine how joint product costs affect such decisions.

Consider **ConAgra** , which produces meat products with brand names such as Swift, Armour, and Butterball. ConAgra cannot kill a sirloin steak; it has to purchase and slaughter a steer, which supplies various cuts of dressed meat, hides, and trimmings. So how does ConAgra determine the proper allocation of the purchase cost paid for the steer to the various meat products and other products produced from a steer? When two or more manufactured products (1) have relatively significant sales values and (2) are not separately identifiable as individual products until their split-off point, we call them **joint products**.

The **split-off point** is that juncture of manufacturing where the joint products become individually identifiable. Any costs beyond that stage are **separable costs** because they are not part of the joint process and the accounting system can exclusively identify them with individual products. We call the costs of manufacturing joint products prior to the split-off point **joint costs**. Further examples of joint products include chemicals, lumber, flour, and the products of petroleum refining.

To illustrate joint costs, suppose **Dow Chemical Company** produces two chemical products, X and Y, as a result of a particular joint process. The joint processing cost is $100,000. This includes raw material costs and the cost of processing before the joint products X and Y reach the split-off point. At the split-off point, Dow can sell X and Y to the petroleum

industry, which uses them as ingredients for gasoline. The relationships follow:



Alternatively, Dow can further process Y into a different product, YA, that it sells to the plastics industry as an ingredient for plastic sheeting. Let's see how Dow's managers develop relevant information to help them decide whether to sell joint products X and Y at the split-off point or to further process Y into YA.

A.Sell or Process Further

Suppose Dow can further process the 500,000 liters of Y into YA, but the additional processing cost would be $.08 per liter for manufacturing and distribution, a total of $40,000 for 500,000 liters. The net sales price of YA would be $0.16 per liter, a total of $80,000.

Dow cannot process product X further and will sell it at the split-off point, but management is undecided about product Y. Should the company sell Y at the split-off point, or should it process Y into YA? To answer this question, we need to find the relevant items involved. Consider first the joint costs—those before the split-off point. They are past costs that cannot

affect anything beyond the split-off point. They violate both attributes of relevancy; they are neither future costs nor differential across alternatives. Therefore they are irrelevant to the question of whether to sell or process further. Relevance requires that the analysis focus on the separable costs and revenues beyond split-off, as shown in Figure (1).

This analysis shows that it would be $10,000 more profitable to further process Y into YA than to sell Y at split-off. The rule is to extend processing on a joint product only if the additional revenue exceeds the additional costs.

Figure (2) illustrates another way to compare the alternatives of (1) selling Y at the split off point and (2) processing Y into YA. It includes the joint costs, which are the same for each alternative and, therefore, do not affect the difference.

Because joint costs would not affect the decision (as Figure (2) demonstrates), we have not allocated the joint costs to products. However, no matter how we might allocate them, the total income effects for the firm would not change.

Figure (1)

Illustration of Sell or Process Further

	Sell at Split-Off as Y	Process Further and Sell as YA	Difference
Revenues……	$30,000	$80,000	$50,000
Separable costs beyond split-off at $0.08……..	-	40,000	40,000
Income effects……	$30,000	$40,000	$10,000

Figure (2)

Sell or Process Further Analysis-Firm as a Whole

	(1) Alternative One			(2) Alternative Two			(3)
	X	Y	Total	X	Y	Total	Differential Effects
Revenues	$90,000	$30,000	$120,000	$90,000	$80,000	$170,000	$50,000
Joint costs			$100,000			$100,000	
Separable costs			-		40,000	40,000	
Total costs			$100,000			$140,000	40,000
Income effects			$20,000			$30,000	$10,000

5. Keeping or Replacing Equipment

We next examine another common decision in business, the replacement of old equipment. One important aspect of such a situation is that the book value of the old equipment is not a relevant consideration in deciding whether to purchase a replacement. Why? Because it is a past cost, not a future cost. When a company purchases equipment, it spreads the cost via **depreciation** expense over the future periods in which it will use the equipment.

The equipment's **book value,** or **net book value,** is the original cost less accumulated depreciation. **Accumulated depreciation** is the sum of all depreciation charged to past periods. For example, suppose a $10,000 machine with a 10-year life span has depreciation of $1,000 per year. At the end of 6 years, accumulated depreciation is 6 * $1,000 = $6,000, and the book value is $10,000 - $6,000 = $4,000.

Consider the following data for a decision about whether to replace an old machine:

	Old Machine	Replacement Machine
Original cost…….	$10,000	$ 8,000
Useful life in years……..	10	4
Current age in years……	6	0
Useful life remaining in years……	4	4
Accumulated depreciation……..	$ 6,000	0
Book value……..	$ 4,000	Not acquired yet
Disposal value (in cash) now……	$ 2,500	Not acquired yet
Disposal value in 4 years……..	0	0
Annual cash operating costs (maintenance, power, repairs, coolants, and so on)…….	$ 5,000	$3,000

Let's prepare a comparative analysis of the two alternatives. Before proceeding, consider some important concepts. The most widely misunderstood facet of replacing equipment is the role of the book value of the old equipment in the decision. We often call the book value a **sunk cost** , which is really just another term for historical or past cost, a cost that the company has already incurred and, therefore, is irrelevant to the decision-making process.

The irrelevance of past costs for decisions does not mean that knowledge of past costs is useless. Often managers use past costs to help predict future costs. In addition, past costs affect future payments for income taxes. However, the past cost itself is not relevant. The only relevant cost is the predicted future cost.

In deciding whether to replace or keep existing equipment, we must consider the relevance of four commonly encountered items:

1. Book value of old equipment: irrelevant because it is a past (historical) cost. Therefore, depreciation on old equipment is also irrelevant.
2. Disposal value of old equipment: relevant because it is an expected future inflow that usually differs across alternatives.
3. Gain or loss on disposal: This is the difference between book value and disposal value. It is therefore a meaningless combination of irrelevant and relevant items. The combination form, loss (or gain) on disposal, blurs the distinction between the irrelevant book value and the relevant disposal value. Consequently, it is best to think of each separately.
4. Cost of new equipment: relevant because it is an expected future outflow that will differ across alternatives. Therefore, the initial cost

of new equipment (or its allocation in subsequent depreciation charges) is relevant.

Figure (3) shows the relevance of these items in our example. Book value of old equipment is irrelevant regardless of the decision-making technique we use. The "difference" column in Figure (4) shows that the $4,000 book value of the old equipment does not differ between alternatives. We should completely ignore it for decision-making purposes. The difference is merely one of timing. The amount written off is still $4,000, regardless of any available alternative. The $4,000 appears on the income statement either as a $4,000 deduction from the $2,500 cash proceeds received to obtain a $1,500 loss on disposal in the first year or as $1,000 of depreciation in each of 4 years. But how it appears is irrelevant to the replacement decision. In contrast, the $2,000 annual depreciation on the new equipment is relevant because the total $8,000 depreciation is a future cost that we can avoid by not replacing the equipment. The three relevant items-operating costs, disposal value, and acquisition cost-give replacement a net advantage of $2,500.

Figure (3)

Cost Comparison-Replacement of Equipment Including Relevant and Irrelevant Items

Four Years Together			
	Keep	Replace	Difference
Cash operating costs……	$20,000	$12,000	$8,000
Old equipment (book value)…….			
Periodic write-off as depreciation…….	4,000	-	-
Or			
Lump-sum write-off……..		4,000*	
Disposal value……..	-	-2,500*	2,500
New machine……			
Acquisition cost……	-	8,000+	-8,000
Total costs……	$ 24,000	$ 21,500	$ 2,500
The advantage of replacement is $2,500 for the 4 years together. *In a formal income statement, these two items would be combined as "loss on disposal" of $4,000 - $2,500= $1,500. † In a formal income statement, written off as straight-line depreciation of $8,000 / 4 = $2,000 for each of 4 years			

Problems

1. Make or Buy

Vineyard Fruit Company sells premium-quality oranges and other citrus fruits by mail order. Protecting the fruit during shipping is important so the company has designed and produces shipping boxes. The annual cost to make 60,000 boxes is as follows:

Materials…….	$ 96,000
Labor……..	12,000
Indirect manufacturing costs:	
Variable……	9,600
Fixed……	46,800
Total…….	$164,400

Therefore, the cost per box averages $2.74. Suppose **Weyerhaeuser** submits a bid to supply Vineyard with boxes for $2.24 per box. Vineyard must give Weyerhaeuser the box design specifications, and the boxes will be made according to those specs.

Required:

A. How much, if any, would Vineyard save by buying the boxes from Weyerhaeuser?

B. What subjective factors should affect Vineyard's decision about whether to make or buy the boxes?

C. Suppose all the fixed costs represent depreciation on equipment that was purchased for $234,000 and is just about at the end of its 5-year life. New replacement equipment will cost $375,000 and is also expected to last 5 years. In this case, how much, if any, would Vineyard save by buying the boxes from Weyerhaeuser?

2. Choice of Products

The Tipbox Tool Company has two products: a plain circular saw and a professional circular saw. The plain saw sells for $50 and has a variable cost of $35. The professional saw sells for $100 and has a variable cost of $60.

Required:

A. Compute contribution margins and contribution-margin ratios for plain and professional saws.

B. The demand is for more units than the company can produce. There are only 40,000 machine hours of manufacturing capacity available. Four plain saws can be produced in the same average time (1 hour) needed to produce one professional saw. Compute the total contribution margin for 40,000 hours for plain saws only and for professional saws only. Which product is the best use of machine hours?

C. Use two or three sentences to state the major lesson of this problem.

3. Make or Buy

Suppose a **BMW** executive in Germany is trying to decide whether the company should continue to manufacture an engine component or purchase it from Frankfurt Corporation for €50 each. Demand for the coming year is expected to be the same as for the current year, 200,000 units. Data for the current year follow:

Direct material…….	€ 5,000,000
Direct labor……..	1,900,000
Factory overhead, variable……	1,100,000
Factory overhead, fixed…….	3,000,000
Total costs……	€11,000,000

If BMW makes the components, the unit costs of direct material will increase by 10%. If BMW buys the components, 30% of the fixed costs will be avoided. The other 70% will continue regardless of whether the components are manufactured or purchased. Assume that variable overhead varies with output volume.

Required:

A. Prepare a schedule that compares the make-or-buy alternatives. Show totals and amounts per unit. Compute the numerical difference between making and buying. Assume that the capacity now used to make the components will become idle if the components are purchased.

B. Assume also that the BMW capacity in question can be rented to a local electronics firm for €1,150,000 for the coming year. Prepare a schedule that compares the net relevant costs of the three alternatives: make, buy and leave capacity idle, buy and rent. Which is the most favorable alternative? By how much in total?

4. Dropping a Product Line

Hamleys Toy Store is on Regent Street in London. It has a magic department near the main door. Suppose that management is considering dropping the magic department, which has consistently shown an operating loss. The predicted income statements, in thousands of pounds (£), are (for ease of analysis, only three product lines are shown):

	Total	**General Merchandise**	**Electronic Products**	**Magic Department**
Sales…….	£6,000	£ 5,000	£400	£600
Variable expenses……	4,090	3,500	200	390
Contribution margin…….	£1,910	£1,500	£200	£210
	(32%)	(30%)	(50%)	(35%)
Fixed expenses (compensation, depreciation, property taxes, insurance, etc.)……..	1,100	750	50	300
Operating income (loss)……	£ 810	750	£150	£ (90)

The £300,000 of magic department fixed expenses include the compensation of employees of £120,000. These employees will be released if the magic department is abandoned. All of the magic department's equipment is fully depreciated, so none of the £300,000 pertains to such items. Furthermore, disposal values of equipment will be exactly offset by the costs of removal and remodeling.

If the magic department is dropped, the manager will use the vacated space for either more general merchandise or more electronic products. The expansion of general merchandise would not entail hiring any additional salaried help, but more electronic products would require an additional person at an annual cost of £30,000.

The manager thinks that sales of general merchandise would increase by £250,000, and electronic products by £200,000. The manager's modest predictions are partially based on the fact that she thinks the magic department has helped lure customers to the store and, thus, improved overall sales. If the magic department is closed, that lure would be gone.

Required:

Should the magic department be closed? Explain, showing computations.

5. Opportunity Costs

Emily Adessa is an attorney employed by a large law fi rm at a salary of $85,000 per year. She is considering whether to become a sole practitioner, which would probably generate annually $410,000 in operating revenues and $290,000 in operating expenses.

Required:

A. Present two tabulations of the annual income effects of these alternatives. The second tabulation should include the opportunity cost of Adessa's compensation as an employee.

B. Suppose Adessa prefers less risk and chooses to stay an employee. Show a tabulation of the income effects of rejecting the opportunity of independent practice.

6. Opportunity Cost of Home Ownership

Ernie McNaire has just made the final payment on his mortgage. He could continue to live in the home; cash expenses for repairs and maintenance (after any tax effects) would be $750 monthly. Alternatively, he could sell the home for $490,000 (net of taxes), invest the proceeds in 3% municipal tax-free bonds, and rent an apartment for $18,000 annually. The landlord would then pay for repairs and maintenance.

Required:

Prepare two analyses of McNaire's alternatives, one showing no explicit opportunity cost and the second showing the explicit opportunity cost of the decision to hold the present home.

7. Opportunity Cost at Nantucket Nectars

Suppose **Nantucket Nectars** has a machine for which it paid $160,000 several years ago and is currently not being used. It can use the machine to produce 12 oz. bottles of its juice cocktails or 12 oz. bottles of its 100% juices. The contribution margin from the additional sales of 100% juices would be $90,000. A third alternative is selling the machine for cash of $75,000.

Required:

What is the opportunity cost of the machine when we analyze the alternative to produce 12 oz. bottles of juice cocktails?

8. Hospital Opportunity Cost

An administrator at **Saint Jude Hospital** is considering how to use some space made available when the outpatient clinic moved to a new building. She has narrowed her choices, as follows:

A. Use the space to expand laboratory testing. Expected future annual revenue would be $330,000; future costs would be $290,000.

B. Use the space to expand the eye clinic. Expected future annual revenue would be $500,000; future costs would be $480,000.

C. The gift shop is rented by an independent retailer who wants to expand into the vacated space. The retailer has offered $11,000 for the yearly rental of the space. All operating expenses will be borne by the retailer. The administrator's planning horizon is unsettled. However, she has decided that the yearly data given will suffice for guiding her decision.

Required:

Tabulate the total relevant data regarding the decision alternatives. Omit the concept of opportunity cost in one tabulation, but use the concept in a second tabulation. As the administrator, which tabulation would you prefer if you could receive only one?

9. Make or Buy

Assume that a division of **Bose** makes an electronic component for its speakers. Its manufacturing process for the component is a highly automated part of a just-in-time production system. All labor is considered to be an overhead cost, and all overhead is regarded as fixed with respect to

output volume. Production costs for 100,000 units of the component are as follows:

Direct materials……..		$400,000
Factory overhead……		
Indirect labor……	$80,000	
Supplies……..	30,000	
Allocated occupancy cost……	40,000	150,000
Total cost……		$550,000

A small, local company has offered to supply the components at a price of $4.20 each. If the division discontinued its production of the component, it would save two-thirds of the supplies cost and $30,000 of indirect-labor cost. All other overhead costs would continue.

The division manager recently attended a seminar on cost behavior and learned about fixed and variable costs. He wants to continue to make the component because the variable cost of $4.00 is below the $4.20 bid.

Required:

A. Compute the relevant cost of (a) making and (b) purchasing the component. Which alternative is less costly and by how much?

B. What qualitative factors might influence the decision about whether to make or to buy the component?

10. Make or Buy at Nantucket Nectars

Assume that **Nantucket Nectars** reports the following costs to make 17.5 oz. bottles for its juice cocktails:

Nantucket Nectars Company Cost of Making 17.5-Ounce Bottles		
	Total Cost for 1,000,000 Bottles	Cost per Bottle
Direct materials……	$ 80,000	$0.080
Direct labor…….	30,000	0.030
Variable factory overhead……	60,000	0.060
Fixed factory overhead…….	85,000	0.085
Total costs……..	$255,000	$.255

Another manufacturer offers to sell Nantucket Nectars the bottles for $0.25. The capacity now used to make bottles will become idle if the company purchases the bottles. Further, one supervisor with a salary of $60,000, a fixed cost, would be eliminated if the bottles were purchased. Prepare a schedule that compares the costs to make and buy the 17.5 oz. bottles.

Required: Should Nantucket Nectars make or buy the bottles?

11. Sell or Process Further

An **Exxon** petrochemical factory produces two products, L and M, as a result of a particular joint process. Both products are sold to manufacturers as ingredients for assorted chemical products. Product L sells at split-off for $.25 per gallon; M sells for $.30 per gallon. Data for April follow:

Joint processing cost……	$1,600,000
Gallons produced and sold	
L……	4,000,000
M……	2,500,000

Suppose that in April the 2,500,000 gallons of M could have been processed further into Super M at an additional cost of $165,000. The Super M output would be sold for $.36 per gallon. Product L would be sold at split-off in any event.

Required: Should M have been processed further in April and sold as Super M? Show your computations.

12. Replacement of Old Equipment

Three years ago, the Oak Street **TCBY** bought a frozen yogurt machine for $11,200. A salesman has just suggested to the TCBY manager that she replace the machine with a new, $13,500 machine. The manager has gathered the following data:

	Old Machine	New Machine
Original cost……...	$11,200	$13,500
Useful life in years…….	8	5
Current age in years……...	3	0
Useful life remaining in years……..	5	5
Accumulated depreciation……	$ 4,200	Not acquired yet
Book value…….	$ 7,000	Not acquired yet
Disposal value (in cash) now……	$ 2,500	Not acquired yet
Disposal value in 5 years……..	0	0
Annual cash operating cost……	$ 5,300	$ 2,700

Required:

A. Compute the difference in total costs over the next 5 years under both alternatives that is, keeping the original machine or replacing it with the new machine. Ignore taxes.

B. Suppose the Oak Street TCBY manager replaces the original machine. Compute the "loss on disposal" of the original machine. How does this amount affect your computation in number 1? Explain.

13. Opportunity Cost

Marnie McKay, MD, is a psychiatrist who is in heavy demand. Even though she has raised her fees considerably during the past 5 years, Dr. McKay still cannot accommodate all the patients who wish to see her.

McKay has conducted 7 hours of appointments a day, 6 days a week, for 46 weeks a year. Her fee averages $225 per hour. Her variable costs are negligible and may be ignored for decision purposes. Ignore income taxes.

Required:

A. McKay is weary of working a 6-day week. She is considering taking every other Saturday off. What would be her annual income (a) if she worked every Saturday and (b) if she worked every other Saturday?

B. What would be her opportunity cost for the year of not working every other Saturday?

C. Assume that Dr. McKay has definitely decided to take every other Saturday off. She loves to repair her sports car by doing the work herself. If she works on her car during half a Saturday when she otherwise would not see patients, what is her opportunity cost?

14. Hotel Rooms and Opportunity Costs

The **Marriott Corporation** operates many hotels throughout the world. Suppose one of its Chicago hotels is facing difficult times because of the opening of several new competing hotels.

To accommodate its flight personnel, **American Airlines** has offered Marriott a contract for the coming year that provides a rate of $70 per night per room for a minimum of 50 rooms for 365 nights.

This contract would assure Marriott of selling 50 rooms of space nightly, even if some of the rooms are vacant on some nights. Assume zero variable costs.

The Marriott manager has mixed feelings about the contract. On several peak nights during the year, the hotel could sell the same space for $150 per room.

Required:

A. Suppose the Marriott manager signs the contract. What is the opportunity cost of the 50 rooms on October 20, the night of a big convention of retailers when every nearby hotel room is occupied? What is the opportunity cost on December 28, when only 10 of these rooms would be expected to be rented at an average rate of $100?

B. If the year-round rate per room averaged $110, what percentage of occupancy of the 50 rooms in question would have to be rented to make Marriott indifferent about accepting the offer?

15. Make or Buy

Dana Corporation , based in Toledo, Ohio, is a global manufacturer of highly engineered products that serve industrial, vehicle, construction, commercial, aerospace, and semiconductor markets. It frequently subcontracts work to other manufacturers, depending on whether Dana's facilities are fully occupied. Suppose Dana is about to make some final decisions regarding the use of its manufacturing facilities for the coming year.

The following are the costs of making part EC113, a key component of an emissions control system:

	Total Cost for 65,000 Units	**Cost per Unit**
Direct materials…….	$ 585,000	$ 9
Direct labor……...	715,000	11
Variable factory overhead……	650,000	10
Fixed factory overhead…….	195,000	6
Total manufacturing costs……	$2,145,000	$33

Another manufacturer has offered to sell the same part to Dana for $28 each. The fixed overhead consists of depreciation, property taxes, insurance, and supervisory salaries. All the fixed overhead would continue if Dana bought the component except that the cost of $130,000 pertaining to some supervisory and custodial personnel could be avoided.

Required:

A. Assume that the capacity now used to make parts will become idle if the parts are purchased. Should Dana buy or make the parts? Show computations.

B. Assume that the capacity now used to make parts will either (a) be rented to a nearby manufacturer for $25,000 for the year or (b) be used to make oil filters that will yield a profit contribution of $15,000. Should Dana buy or make part EC113? Show your computations.

16. Relevant-Cost Analysis

Following are the unit costs of making and selling a single product at a normal level of 5,000 units per month and a current unit selling price of $90:

Manufacturing costs	
Direct materials…….	$35
Direct labor…….	12
Variable overhead……	8
Fixed overhead (total for the year, $300,000)…….	5
Selling and administrative expenses…….	
Variable…….	15
Fixed (total for the year, $480,000)……..	8

Consider each requirement separately. Label all computations, and present your solutions in a form that will be comprehensible to the company president.

Required:

A. This product is usually sold at a rate of 60,000 units per year. It is predicted that a rise in price to $98 will decrease volume by 10%. How much may advertising be increased under this plan without having annual operating income fall below the current level?

B. The company has received a proposal from an outside supplier to make and ship this item directly to the company's customers as sales orders are forwarded. Variable selling and administrative costs would fall 40%. If the supplier's proposal is accepted, the company will use its own plant to produce a new product. The new product would be sold through manufacturer's agents at a 10% commission based on a

selling price of $40 each. The cost characteristics of this product, based on predicted yearly normal volume, are as follows.

	Per Unit
Direct materials……	$ 6
Direct labor…….	12
Variable overhead…….	8
Fixed overhead…….	6
Manufacturing costs…….	$ 32
Selling and administrative expenses	
Variable (commission)…….	10% of selling price
Fixed……...	$ 2

Required:

What is the maximum price per unit that the company can afford to pay to the supplier for subcontracting production of the entire old product? Assume the following:

- Total fixed factory overhead and total fixed selling expenses will not change if the new product line is added.
- The supplier's proposal will not be considered unless the present annual net income can be maintained.
- Selling price of the old product will remain unchanged at $90.
- All $300,000 of fixed manufacturing overhead will be assigned to the new product.

17. Choice of Products

Gulf Coast Fashions sells both designer and moderately priced women's wear in Tampa. Profits have been volatile. Top management is trying to decide which product line to drop. Accountants have reported the following data:

	Per Item	
	Per Item Designer	**Moderately Priced**
Average selling price……..	$240	$150
Average variable expenses……..	120	85
Average contribution margin……	$120	$ 65
Average contribution-margin percentage……	50%	43%

The store has 8,000 square feet of floor space. If moderately priced goods are sold exclusively, 400 items can be displayed. If designer goods are sold exclusively, only 300 items can be displayed. Moreover, the rate of sale (turnover) of the designer items will be two-thirds the rate of moderately priced goods.

Required:

A. Prepare an analysis to show which product to drop.

B. What other considerations might affect your decision in number A?

18. Joint Costs and Incremental Analysis

Jacque de Paris, a high-fashion women's dress manufacturer, is planning to market a new cocktail dress for the coming season. Jacque de Paris supplies retailers in Europe and the United States.

Four yards of material are required to lay out the dress pattern. Some material remains after cutting, which can be sold as remnants. The leftover material could also be used to manufacture a matching cape and handbag. However, if the leftover material is to be used for the cape and handbag, more care will be required in the cutting, which will increase the cutting costs.

The company expects to sell 1,000 dresses if no matching cape or handbag is available. Market research reveals that dress sales will be 15% higher if a matching cape and handbag are available. The market research indicates that the cape and handbag will not be sold individually, but only as accessories with the dress. The various combinations of dresses, capes, and handbags that are expected to be sold by retailers are as follows:

The material used in the dress costs €90 a yard, or €360 for each dress. The cost of cutting the dress if the cape and handbag are not manufactured is estimated at €105 a dress, and the resulting remnants can be sold for €24 for each dress cut out. If the cape and handbag are to be manufactured, the cutting costs will be increased by €34 per dress. There

will be no salable remnants if the capes and handbags are manufactured in the quantities estimated. The selling prices and the costs to complete the three items once they are cut are as follows:

	Selling Price per Unit	**Unit Cost to Complete (Excludes Cost of Material and Cutting Operation)**
Dress……	€1,100	€600
Cape……	120	70
Handbag…….	40	30

Required:

A. Calculate the incremental profit or loss to Jacque de Paris from manufacturing the capes and handbags in conjunction with the dresses.

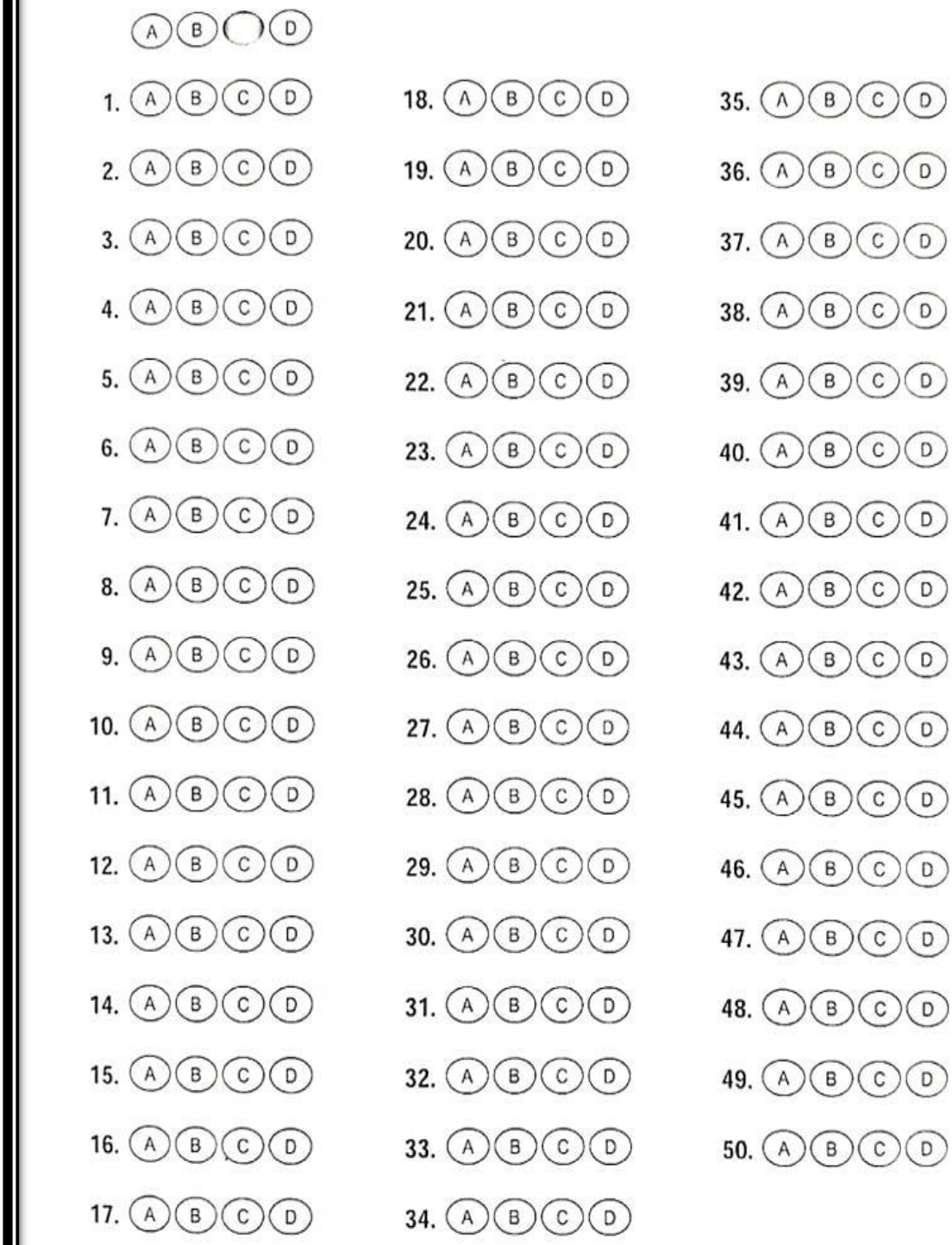
B. Identify any non-quantitative factors that could influence the company's management in its decision to manufacture the capes and handbags that match the dress.

Bubble Answer Sheet

(A) (B) (C) (D)

1. (A) (B) (C) (D)	18. (A) (B) (C) (D)	35. (A) (B) (C) (D)
2. (A) (B) (C) (D)	19. (A) (B) (C) (D)	36. (A) (B) (C) (D)
3. (A) (B) (C) (D)	20. (A) (B) (C) (D)	37. (A) (B) (C) (D)
4. (A) (B) (C) (D)	21. (A) (B) (C) (D)	38. (A) (B) (C) (D)
5. (A) (B) (C) (D)	22. (A) (B) (C) (D)	39. (A) (B) (C) (D)
6. (A) (B) (C) (D)	23. (A) (B) (C) (D)	40. (A) (B) (C) (D)
7. (A) (B) (C) (D)	24. (A) (B) (C) (D)	41. (A) (B) (C) (D)
8. (A) (B) (C) (D)	25. (A) (B) (C) (D)	42. (A) (B) (C) (D)
9. (A) (B) (C) (D)	26. (A) (B) (C) (D)	43. (A) (B) (C) (D)
10. (A) (B) (C) (D)	27. (A) (B) (C) (D)	44. (A) (B) (C) (D)
11. (A) (B) (C) (D)	28. (A) (B) (C) (D)	45. (A) (B) (C) (D)
12. (A) (B) (C) (D)	29. (A) (B) (C) (D)	46. (A) (B) (C) (D)
13. (A) (B) (C) (D)	30. (A) (B) (C) (D)	47. (A) (B) (C) (D)
14. (A) (B) (C) (D)	31. (A) (B) (C) (D)	48. (A) (B) (C) (D)
15. (A) (B) (C) (D)	32. (A) (B) (C) (D)	49. (A) (B) (C) (D)
16. (A) (B) (C) (D)	33. (A) (B) (C) (D)	50. (A) (B) (C) (D)
17. (A) (B) (C) (D)	34. (A) (B) (C) (D)	

Bubble Answer Sheet



Chapter (5)

Introduction to Budgets and Preparing the Master Budget

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1. Budgets and the Organization

Many people associate the word *budget* primarily with limitations on spending. For example, management often gives each unit in an organization a spending budget and then expects them to stay within the limits prescribed by the budget. However, budgeting can play a much more important role than simply limiting spending. Budgeting moves planning to the forefront of the manager's mind. Well-managed organizations make budgeting an integral part of the formulation and execution of their strategy.

Budget is defined as a quantitative expression of a plan of action. Sometimes plans are informal, perhaps even unwritten, and informal plans sometimes work in a small organization. However, as an organization grows, seat-of-the-pants planning is not enough. Budgets impose the formal structure-a budgetary system—that is needed for all but the smallest organizations.

There are numerous examples of seemingly healthy businesses that failed because managers did not bother to construct budgets that would have identified problems in advance or they failed to monitor and adjust budgets to changing conditions. While there will always be debate about the

costs and benefits of budgeting, as indicated in the Business First box, the vast majority of managers continue to use budgeting as an effective cost-management tool.

✓ Advantages of Budgeting

Budgeting is the process of formulating an organization's plans. We will discuss four major advantages of effective budgeting:

A. Budgeting compels managers to think ahead by formalizing their responsibilities for planning.
B. Budgeting provides an opportunity for managers to reevaluate existing activities and evaluate possible new activities.
C. Budgeting aids managers in communicating objectives and coordinating actions across the organization.
D. Budgeting provides benchmarks to evaluate subsequent performance.

Let's look more closely at each of these benefits.

- **Formalization of Planning** Budgeting forces managers to devote time to planning. On a day-to-day basis, managers often move from extinguishing one business brush fire to another, leaving no time for thinking beyond the next day's problems. As a result, planning takes a backseat to, or is obliterated by, daily pressures. The budgeting

process formalizes the need to anticipate and prepare for changing conditions.

To prepare a budget, a manager should set objectives and establish policies to aid their achievement. The objectives are the destination points, and budgets are the road maps guiding us to those destinations. In the absence of goals and objectives, results are difficult to interpret, managers do not foresee problems, and company operations lack direction.

- **Evaluation of Activities** Budgeting typically uses the current activities of the organization as a starting point for planning, but how managers use this starting point varies widely. At one extreme, in some organizations the budget process automatically assumes that activities for the new budget period will be the same as the activities for the previous period. At the other extreme, some organizations use a form of **zero-base budget** , which starts with the assumption that current activities will not automatically be continued. The term zero-base comes from the fundamental assumption that the budget for every activity starts at zero. The advantage of a zero-base system is that managers reevaluate all activities (including whether existing activities should be continued) in each new budget.

In practice, budgeting for most organizations falls somewhere between these two extremes. An effective budget process encourages managers to think carefully about whether to continue current activities and methods, whether there are opportunities to modify activities, and whether to add new activities to help the organization better achieve its goals in response to changing conditions. Used in this way, budgeting encourages managers to review whether a particular plan allocates resources optimally among the firm's various activities.

- **Communication and Coordination** The most effective budget processes facilitate communication both from the top down and from the bottom up. Top management communicates the strategic goals and objectives of the organization in its budgetary directives. Lower-level managers and employees contribute their own ideas and provide feedback on the goals and objectives. The result is two-way communication about opportunities and challenges that lie ahead.

Budgets also help managers coordinate activities across the organization. For example, a budget allows purchasing personnel to integrate their plans with production requirements, while production managers use the sales budget and delivery schedule to help them anticipate and plan for the employees and physical facilities they will need. Similarly, financial officers use the sales budget, purchasing requirements, and other

planned expenditures to anticipate the company's need for cash. Thus, budgeting forces managers to communicate and coordinate their department's activities with those of other departments and the company as a whole.

- **Performance Evaluation** Budgeted performance goals generally provide a better basis for evaluating actual results than would a simple comparison with past performance. Relying only on historical results for judging current performance may allow inefficiencies in past performance to continue undetected. Changes in economic conditions, technology, personnel, competition, and other factors also limit the usefulness of comparisons with the past. For example, sales of $100 million this year, for a company that had sales of $80 million the previous year, may or may not indicate that company objectives have been met—perhaps conditions imply that the sales goal for this year should have been $110 million.

2. Potential Problems in Implementing Budgets

In this section, we discuss three problems that can limit, in some cases severely, the advantages of budgeting:

A. Low levels of participation in the budget process and lack of acceptance of responsibility for the final budget.

B. Incentives to lie and cheat in the budget process.

C. Difficulties in obtaining accurate sales forecasts.

❖ **Budget participation and Acceptance of the Budget**

The advantages of budgeting are fully realized only when employees throughout the organization accept and take responsibility for the final budget. The main factors affecting budget acceptance are as follows:

a) The perceived attitude of top management.

b) The level of participation in the budget process.

c) The degree of alignment between the budget and other performance goals

The attitude of top management will heavily influence lower-level managers' and employees' attitudes toward budgets. If top management does not use budgets effectively in controlling operations and adapting to change, others in the organization may come to view budgeting as irrelevant. Even with the support of top management, however, budgets8and the managers who implement them can run into opposition.

Lower-level managers sometimes have negative attitudes toward budgets because they believe the primary purpose of the budget is to limit spending. These negative attitudes are reinforced when companies evaluate managerial performance by comparing actual expenditures against amounts budgeted without substantive input from the managers. Ensuring that managers at all levels participate in setting budgets is one way to reduce negative attitudes and improve the quality of planning decisions. Budgets created with the active participation of all affected employees-called **participative budgeting** - are generally more effective than budgets imposed on subordinates. For example, Ritz-Carlton's budgeting system involves all hotel employees and is thus a participative system. Employee "buy-in" to the budget is so important at Ritz-Carlton that self-directed employee teams at all levels of the company have the authority to change operations based on budgets as they see fit.

Misalignment between the performance goals stressed in budgets versus the performance measures the company uses to reward employees and managers can also limit the advantages of budgeting. For example, suppose a company rewards managers based on actual profit compared to budgeted profit and also on quality (defect rate) and timely delivery to customers (percent on time). Increased quality and more timely deliveries typically require higher costs, so the message conveyed by the budget

system (minimize cost) may be misaligned with the incentives provided by the compensation system (maximize quality and timely delivery). Companies can manage the apparent misalignment by clearly specifying and communicating the tradeoff between costs and quality measures. This is particularly important for performance goals where the short-term impact on current performance relative to budget is negative but the long-term impact due to improved customer satisfaction is positive.

There is often too much concern with the mechanics of budgets and too little attention paid to the fact that the effectiveness of any budgeting system depends directly on whether the affected managers and employees understand and accept the budget. Management should seek to create an environment where there is a true two-way flow of information in the budget process so that lower level managers and employees perceive that their input has a real effect on budget outcomes. Top management must emphasize the importance of budgets in planning and communication and demonstrate how budgets can help each manager and employee achieve better results. Only then will the budgets become a positive aid in motivating employees at all levels to work toward goals, set objectives, measure results accurately, and direct attention to the areas that need investigation.

❖ Incentives to Lie and Cheat

Effective budgets provide targets for managers and motivate them to achieve the organization's objectives. However, misuse of budgets can lead to undesirable incentives—what Professor Michael Jensen calls incentives to lie and cheat. Not only do such incentives lead managers to make poor decisions, they undercut attempts to maintain high ethical standards in the organization.

Let's first consider lying. What incentives might cause managers to create biased budgets-essentially to lie about their plans? Managers may want to increase the resources allocated to their department—resources such as space, equipment, and personnel-and larger budgets may justify such allocations. Why do managers want more resources? Day-to-day managing is easier when the department has more resources to achieve its output targets. Further, it is common for managers of larger units with more resources to have higher pay, higher status, and greater prospects for promotion. Recognizing these incentives allows organizations to implement budgets in a way that minimizes bias.

For example, when employees understand, accept, and participate in the budget process, they are less likely to introduce biased information. Also, decision makers can be aware of expected bias when they make decisions based on budget information.

When organizations use budgets as a target for performance evaluations, managers have additional incentives to lie. Managers have incentives to create **budgetary slack** or **budget padding** -that is, overstate their budgeted costs or understate their budgeted revenues to create a budget target that is easier to achieve. Budgetary slack also helps buffer managers from budget cuts imposed by higher-level management and provides protection against cost increases or revenue shortfalls due to unforeseen events.

These incentives can lead to the following cycle that destroys the value of budget information: Lower-level managers bias their budgets to create budgetary slack. Knowing that lower-level managers face these incentives, upper-level managers correct for this bias in their inputs to the budget process. Lower-level managers, recognizing that upper-level managers are making this correction, then incorporate additional bias to compensate. Upper-level managers then introduce larger corrections to compensate for the increased bias. This cycle of increasing bias and increasing bias corrections causes increasing distortion in budget information. Inputs from both upper-level and lower-level managers become increasingly meaningless, and the budget process spirals out of control.

❖ Difficulties of Obtaining Accurate Sales Forecasts

The third problem that limits the advantages of budgets is the difficulty of obtaining accurate sales forecasts. The sales budget is the foundation of budgeting. Why? Because the accuracy of all components of the budget depends on the accuracy of budgeted sales, as illustrated later in the chapter. At the **Ritz-Carlton** hotels, the process of developing the sales budget involves forecasting levels of room occupancy, group events, banquets, and other activities. Upper management initially sets the sales targets. Then, employee teams in each department provide their inputs. Once everyone agrees on a sales forecast, managers prepare monthly departmental budgets based on the sales forecast.

The sales budget is conceptually distinct from sales forecasts. A **sales forecast** is a prediction of sales under a given set of conditions. The **sales budget** is the specific sales forecast that is the result of decisions to create the conditions that will generate a desired level of sales. For example, you may have various forecasts of sales corresponding to various levels of advertising. The sales forecast for the one level of advertising you decide to implement becomes the sales budget.

The top sales executive usually directs the preparation of sales forecasts. Important factors considered by sales forecasters include the following:

1. Past patterns of sales: Past experience combined with detailed past sales by product line, geographic region, and type of customer can help predict future sales.

2. Estimates made by the sales force: A company's sales force is often the best source of information about the desires and plans of customers.

3. General economic conditions: The financial press regularly publishes predictions for many economic indicators, such as gross domestic product and industrial production indexes (local and foreign). Knowledge of how sales relate to these indicators can aid sales forecasting.

4. Competitors' actions: Sales depend on the strength and actions of competitors. To forecast sales, a company should consider the likely strategies and reactions of competitors, such as changes in their prices, product quality, or services.

5. Changes in the firm's prices: A company should consider the effects of planned price changes on customer demand. Normally, lower prices increase unit sales while higher prices decrease unit sales.

6. Changes in product mix: Changing the mix of products often can affect not only sales levels but also overall contribution margin. Identifying the most profitable products and devising methods to increase their sales is a key part of successful management.

7. Market research studies: Some companies hire marketing experts to gather information about market conditions and customer preferences. Such information is useful to managers making sales forecasts and product-mix decisions.

8. Advertising and sales promotion plans: Advertising and other promotional costs affect sales levels. A sales forecast should be based on anticipated effects of promotional activities.

Sales forecasting usually combines various techniques. In addition to the opinions of the sales staff, statistical analysis of correlations between sales and economic indicators (prepared by economists and members of the market research staff) provide valuable help. The opinions of line management also heavily influence the final sales forecasts. No matter how many technical experts a company uses in forecasting, the sales budget should ultimately be the responsibility of line management. Line managers who participate fully in setting the sales budget will be more committed to achieving the budget goals.

Governments and other nonprofit organizations face a similar problem in forecasting revenues from taxes, contributions, or other sources. For example, city revenues may depend on a variety of factors, such as property taxes, traffic fines, parking fees, license fees, and city income taxes. In turn, property taxes depend on the extent of new construction and general increases in real estate values. Thus, forecasting revenues for a government or nonprofit organization may require just as much sophistication as sales forecasts of a for-profit firm.

3. **Types of Budgets**

Businesses use several different types of budgets. The most forward-looking and least detailed budget is the **strategic plan** , which sets the overall goals and objectives of the organization. While the strategic plan does not deal with a specific time frame and does not produce forecasted financial statements, it provides the overall framework for the **long-range plan** . Long-range plans typically produce forecasted financial statements for 5- to 10-year periods.

Decisions made during long range planning include addition or deletion of product lines, design and location of new plants, acquisitions of buildings and equipment, and other long-term commitments. Companies coordinate their long-range plan with their **capital budget,** which details the planned expenditures for facilities, equipment, new products, and other

long-term investments. Short-term plans and budgets guide day-to-day operations.

The **master budget** is a detailed and comprehensive analysis of the first year of the long range plan. It quantifies targets for sales, purchases, production, distribution, and financing in the form of forecasted financial statements and supporting operating schedules. These schedules provide detailed information beyond what appears in the forecasted financial statements. Thus, the master budget includes forecasts of sales, expenses, balance sheets, and cash receipts and disbursements.

Many companies break their annual budgets into 4 quarterly or even 12 monthly budgets. A **continuous budget** or **rolling budget** is a master budget that simply adds a month (or quarter) in the future as the month (or quarter) just ended is dropped. Continuous budgets force managers to always think about the next full year, not just the remainder of the current fiscal year, so budgeting becomes an ongoing process instead of a once-a-year exercise.

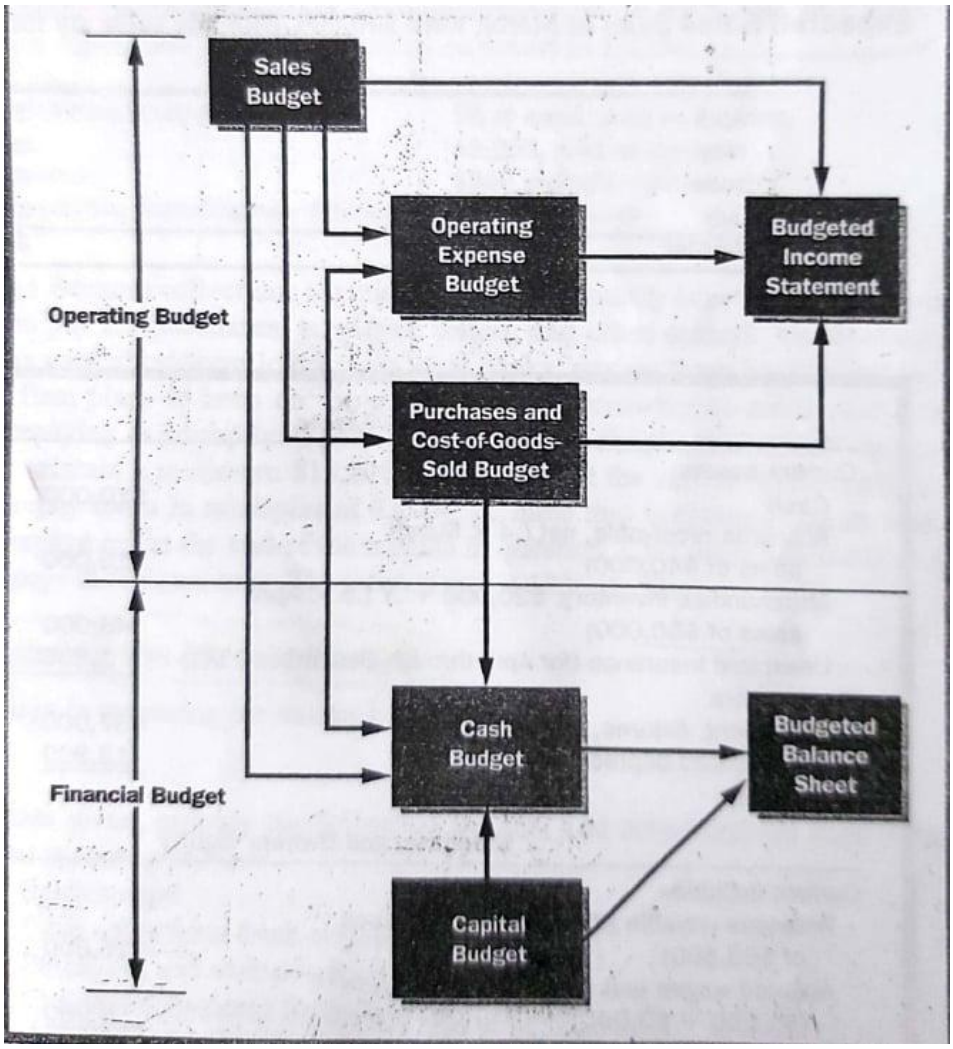
✓ Components of the Master Budget

The two major parts of a master budget are the operating budget and the financial budget. The **operating budget** - sometimes called the **profit plan** - focuses on the income statement and its supporting schedules or, in an organization with no sales revenues, on budgeted expenses and supporting

schedules. In contrast, the **financial budget** focuses on the effects that the operating budget and other plans (such as capital expenditures and repayments of debt) will have on cash balances. The distinction between the operating budget and the financial budget is important because of the distinction between profitability and financial position. There are many examples of firms with strong profits where a weak cash position placed them in bankruptcy. There are also many examples of firms whose strong financial position allowed them to survive periods of temporary unprofitability.

Figure (1)

Preparation of the Master Budget for a Merchandising Company



The terms used to describe specific budget schedules vary from organization to organization. However, most master budgets share common elements. The usual master budget for a merchandising company has the following components as shown in **Figure 1:**

A. Operating budget

1. Sales budget

2. Operating expense budget

3. Purchases and cost-of-goods-sold budget

4. Budgeted income statement

B. Financial budget

1. Cash budget

2. Capital budget

3. Budgeted balance sheet

Other companies add to or adapt these categories depending on the nature of their operations. For example, manufacturing companies add budgets for raw material, work-in process, and finished goods inventories, and budgets for each type of resource activity, such as labor, materials, and factory overhead. Similarly, a consulting company might adapt the operating expense budget to focus on its major cost—consultant salaries. In addition to the master budget, there are countless forms of special budgets and related reports. For example, a report might detail goals and objectives for improvements in quality or customer satisfaction during the budget period.

4. Preparing the Master Budget

Let's return to **Figure 1** and trace the preparation of the master budget components. Although the process involves a large number of detailed calculations, always keep the big picture in mind. Remember that the master budgeting process provides an opportunity to review key decisions regarding all aspects of the company's value chain. Early drafts of the budget often lead to decisions that, in turn, lead to revisions in subsequent budget drafts. This cycle may be repeated several times before the budget is finalized.

- ✓ **The Cooking Hut**

We illustrate the budgeting process using the Cooking Hut Company (CHC), a retailer of a wide variety of kitchen and dining room items, such as coffeemakers, silverware, and table linens. Although master budgets normally cover a full year, for the sake of brevity this illustration shows only the first 3 months of CHC's fiscal year, April–June. Figure 4-2 is the closing balance sheet for the previous fiscal year ending March 31, 20X1.

Sales Budget Preparation of the master budget for the first 3 months of the new fiscal year requires a sales budget for 1 month beyond the 3 months because CHC bases its budgeted inventory purchases on the following month's sales. The sales budget for the next 4 months is as follows:

April…….	$50,000
May……..	$80,000
June…….	$60,000
July……..	$50,000

The master budget also requires information about actual sales in the previous month because CHC collects cash for the credit sales in the month following the sale. On average, 60% of sales are cash sales and the remaining 40% are credit sales. Sales in March were $40,000 and the $16,000 of accounts receivable on March 31 represents credit sales made in March (40% of $40,000). Uncollectible accounts are negligible and thus ignored. For simplicity's sake, we also ignore all local, state, and federal taxes for this illustration.

Figure (2)

The Cooking Hut Company , *Balance Sheet March 31, 20X1*

Assets		
Current assets		
Cash	$10,000	
Accounts receivable, net (0.4 * March sales of $40,000)	16,000	
Merchandise inventory, $20,000 + 0.8 (0.7 April sales of $50,000)	48,000	
Unexpired insurance (for April–December 20X1)	1,800	$ 75,800
Plant assets		
Equipment, fixtures, and other	$37,000	
Accumulated depreciation	12,800	24,200
Total assets		**$ 100,000**
Liabilities and Owners' Equity		
Current liabilities		
Accounts payable (0.5*March purchases of $33,600)	$16,800	
Accrued wages and commissions payable ($1,250 + $3,000)	4,250	$ 21,050
Owners' equity		78,950
Total liabilities and owners' equity		**$100,000**

Planned Inventory Levels Because deliveries from suppliers and customer demands are uncertain, at the end of each month CHC wants to have on hand a base inventory of $20,000 plus additional inventory equal to 80% of the expected cost of goods sold for the following month. The cost of goods sold averages 70% of sales. Therefore, the inventory on March 31 is $20,000 + (0.8 *0.7 * April sales of $50,000) = $20,000 + $28,000 = $48,000. On average, CHC pays for 50% of each month's purchases during the month of purchase and 50% during the next month. Therefore, the accounts payable balance on March 31 is 50% of March purchases, or 0.5 * $33,600 = $16,800

Wages and Commissions CHC pays wages and commissions twice each month, with payments lagged half a month after they are earned. Each payment consists of two components: (i) one-half of monthly fixed wages of $2,500, and (ii) commissions equal to 15% of sales, which we assume are uniform throughout each month. To illustrate the wage and commission payments, the March 31 balance of accrued wages and commissions payable is (0.5 * $2,500) + 0.5 * (0.15* $40,000) = $1,250 + $3,000 = $4,250. Because of the half-month lag, CHC will pay this $4,250 balance on April 15.

Capital Expenditures and Operating Expenditures CHC's only planned capital expenditure is the purchase of new fixtures for $3,000 cash in April. CHC has monthly operating expenses as follows:

Miscellaneous expenses…….....	5% of sales, paid as incurred
Rent……..	$2,000, paid as incurred
Insurance…….	$200 expiration per month
Depreciation, including new fixtures……	$500 per month

Cash Balances Because collections lag credit sales, CHC often struggles to come up with the cash to pay for purchases, employee wages, and other outlays. To meet cash needs, CHC uses short-term loans from local banks, paying them back when excess cash is available. CHC maintains a minimum $10,000 cash balance at the end of each month for operating purposes and can borrow or repay loans only in multiples of $1,000. Assume that borrowing occurs at the beginning and repayments occur at the end of the month. Also assume that interest of 1% per month is paid in cash at the end of each month.

☒ Steps in Preparing the Master Budget

The principal steps in preparing the master budget are as follows:

❖ Supporting Budgets and Schedules

1. Using the data given, prepare the following budgets and schedules for each of the months of the planning horizon:

   Schedule a. Sales budget

   Schedule b. Cash collections from customers

   Schedule c. Purchases and cost-of-goods-sold budget

   Schedule d. Cash disbursements for purchases

   Schedule e. Operating expense budget

   Schedule f. Cash disbursements for operating expenses

❖ Operating Budget

2. Using the supporting budgets and schedules, prepare a budgeted income statement for the 3 months ending June 30, 20X1.(figure 6)

❖ Financial Budget

3. Prepare the following budgets and forecasted financial statements:
   a. Capital budget
   b. Cash budget, including details of borrowings, repayments, and interest for each month of the planning horizon.(figure 7)
   c. Budgeted balance sheet as of June 30, 20X1.(figure 8)

Organizations with effective budget systems have specific guidelines for the steps and timing of budget preparation. Although the details differ, the guidelines invariably include the preceding steps. As we follow these steps to prepare CHC's master budget, be sure that you understand the source of each figure in each schedule and budget.

Step 1: Preparing Basic Data

Step 1A: Sales Budget The sales budget is the starting point for budgeting because planned inventory levels, purchases, and operating expenses all depend on the expected level of sales. Schedule a includes information about actual March sales because March credit sales affect cash collections in April.

Schedule a: Sales Budget

	March	April	May	June	April–June Total
Total Sales	$40,000	$50,000	$80,000	$60,000	$190,000

Step 1B: Cash Collections From Customers Schedule b uses the sales budget to plan when CHC will collect cash. In turn, we will use Schedule b to prepare the cash budget in step 3. Cash collections from customers include the current month's cash sales plus collection of the previous month's credit sales.

Schedule b: Cash Collections from Customers			
	April	May	June
Cash sales (60% of current month sales)……..	$30,000	$48,000	$36,000
Collection of last month's credit sales (40% of previous month sales)……..	16,000	20,000	32,000
Total collections……..	$46,000	$68,000	$68,000

Step1C: Purchases Budget The elements of the purchases budget are tied together by a simple intuitive identity that ignores minor complications such as returns and defects but relates the fundamental uses of inventory to the sources: Inventory is either sold or else carried over to the next period as ending inventory. Inventory comes from either beginning inventory or purchases. Therefore, cost of goods sold plus ending inventory equals beginning inventory plus purchases.

We budget cost of goods sold by multiplying the cost of merchandise sold percentage (70%) by budgeted sales. The total merchandise needed is the sum of budgeted cost of goods sold plus the desired ending inventory. Finally, we compute required purchases by subtracting beginning inventory from the total merchandise needed:

Schedule c: Purchases Budget					
	March	April	May	June	April–June Total
Budgeted cost of goods sold[1]		$35,000	$ 56,000	$42,000	$133,000
Plus: Desired ending inventory**		64,800	53,600	48,000	
Total merchandise needed		$99,800	$109,600	$90,000	
Less: Beginning inventory		48,000[2]	64,800	53,600	
Purchases	$33,600[3]	$51,800	$ 44,800		

[1]0.7 * April sales of $50,000 = $35,000; 0.7 * May sales of $80,000 = $56,000; 0.7 * June sales of $60,000 = $42,000

** $20,000 + (0.80 * next month cost of goods sold)

[2]Ending inventory from March was $48,000 as shown in **Figure (2)**.

[3]Purchases for March were ending inventory ($48,000 as shown in **Figure (2)** plus cost of goods sold (0.7 * March sales of $40,000) less beginning inventory ($42,400 = $20,000 + [0.8 * March cost of goods sold of $28,000]).

Step 1D: Disbursements For Purchases We use the purchases budget to develop Schedule d. In our example, disbursements are 50% of the current month's purchases and 50% of the previous month's purchases.

Schedule d: Cash Disbursements for Purchases			
	April	May	June
50% of last month's purchases	$16,800	$25,900	$22,400
Plus 50% of this month's purchases	25,900	22,400	18,200
Disbursements for purchases	$42,700	$48,300	$40,600

Step 1E: Operating Expense Budget Month-to-month changes in sales volume and other cost-driver activities directly influence many operating expenses. Examples of expenses driven by sales volume include sales commissions and delivery expenses—these are included in miscellaneous expenses for CHC. Other expenses, such as rent, insurance, depreciation, and wages, are not influenced by sales (within appropriate relevant ranges), and we regard them as fixed. Schedule e summarizes operating expenses for CHC.

Schedule e: Operating Expense Budget					
	March	April	May	June	April–June Total
Wages (fixed)	$2,500	$ 2,500	$ 2,500	$ 2,500	
Commissions (15% of current month's sales)	6,000	7,500	12,000	9,000	
Total wages and commissions	$8,500	$10,000	$14,500	$11,500	$36,000
Miscellaneous expenses (5% of current sales)		2,500	4,000	3,000	9,500
Rent (fixed)		2000	2000	2000	6,000
Insurance (fixed)		200	200	200	600
Depreciation (fixed)		500	500	500	1500
Total operating expenses		$15,200	$21,200	$17,200	$53,600

Step 1F: Disbursements for Operating Expenses Disbursements for operating expenses are based on the operating expense budget. Disbursements include 50% of last month's wages and commissions, 50% of this month's wages and commissions, and miscellaneous and rent expenses. There is no monthly cash disbursement

for Insurance (which is paid annually at the beginning of the year) nor for depreciation (which does not involve any periodic cash disbursement). We will use the total of these disbursements for each month in preparing the cash budget .

Schedule f: Disbursements for Operating Expenses			
	April	May	June
Wages and commissions			
50% of last month's expenses	$ 4,250	$ 5,000	$ 7,250
50% of this month's expenses	5,000	$ 7,250	5,750
Total wages and commissions	$ 9,250	$12,250	$13,000
Miscellaneous expenses	2,500	4,000	3,000
Rent	2,000	2,000	2,000
Total disbursements	$13,750	$18,250	$18,000

Step 2: Preparing the Operating Budget

Steps 1a, 1c, and 1e, along with interest expense from the cash budget (which we will construct in step 2) , provide information to construct the budgeted income statement in figure (3) . Budgeted income from operations is often a benchmark for judging management performance.

figure (3)

The Cooking Hut Company *Budgeted Income Statement*

for Three Months Ending June 30, 20X1

		Data	Source of Data
Sales		$190,000	Schedule a
Cost of goods sold		133,000	Schedule c
Gross margin		$ 57,000	
Operating expenses			Schedule e
Wages and commissions	$36,000		Schedule e
Rent	6,000		Schedule e
Miscellaneous	9,500		Schedule e
Insurance	600		Schedule e
Depreciation	1,500	53,600	
Income from operations		$ 3,400	
Interest expense		410	
Net income		$ 2,990	

Step 3: Preparation of Financial Budget

The second major part of the master budget is the financial budget, which consists of the capital budget, cash budget, and ending balance sheet.

Step 3A: Capital Budget

In our illustration, the $3,000 planned purchase of new fixtures in April is the only item in the capital budget.

Step 3B: Cash Budget

The **cash budget** is a statement of planned cash receipts and disbursements. Cash budgets help management avoid either unnecessary idle cash or unnecessary cash deficiencies. The cash budget is heavily affected by the level of operations summarized in the budgeted income statement.

The cash budget in figure 4 has the following major sections, where the letters *x* , *y* , and *z* refer to the lines that summarize the effects of that section:

- The available cash balance (*x*) is the amount by which the beginning cash balance exceeds CHC's $10,000 minimum cash balance. Companies maintain a minimum cash balance to allow for fluctuations in the level of cash during the month-daily balances during the month typically fluctuate relative to the beginning and ending cash balances-and also to provide for unexpected cash needs.
- Net cash receipts and disbursements (*y*):

1. Cash receipts depend on collections from customers' accounts receivable, cash sales, and on other operating cash income sources, such as interest received on notes receivable. Trace total collections from Schedule b to figure 5.

2. Disbursements for purchases depend on the credit terms extended by suppliers and the bill-paying habits of the buyer. Trace disbursements for merchandise from Schedule d.

Figure 4

The Cooking Hut Company

Cash Budget for Three Months

Ending June 30, 20X1

	April	**May**	**June**
Beginning cash balance	$ 10,000	$ 10,410	$ 10,720
Minimum cash balance desired	10,000	10,000	10,000
Available cash balance (*x*)	**$ 0**	**$ 410**	**$ 720**
Cash receipts and disbursements			
Collections from customers (Schedule b [(1)])	$ 46,000	$ 68,000	$ 68,000
Payments for merchandise (Schedule d)	(42,700)	(48,300)	(40,600)
Payments for operating expenses (Schedule f)	(13,750)	(18,250)	(18,000)
Purchase of new fixtures (Step 3a)	(3,000)	-	-
Net cash receipts and disbursements (*y*)	$ (13,450)	$ 1,450	$ 9,400
Excess (deficiency) of cash before financing (*x* + *y*)	**(13,450)**	**$ 1,860**	**$ 10,120**
Borrowing (at beginning of month)	$ 14,000 [(2)]	-	-
Repayments (at end of month)	-	$ (1,000)	$ (9,000)
Interest payments (1% per month, end of month [(3)])	(140)	(140)	(130)
Total cash increase (decrease) from financing (*z*)	$ 13,860	$ (1,140)	$ (9,130)
Ending cash balance (beginning + *y* + *z*)	**$ 10,410**	**$ 10,720**	**$ 10,990**

[(1)]Letters *x* , *y* , and *z* are keyed to the explanation in the text.

[(2)]Borrowing and repayment of principal are made in multiples of $1,000, at an interest rate of 1% per month.

[(3)]Interest computations: $14,000 * .01 = $140; $14,000 * 0.01 = $140; $13,000 * .01 = $130.

3. Payroll depends on wages and commission terms and on payroll dates. Some costs and expenses depend on contractual terms for installment payments, mortgage payments, rents, leases, and miscellaneous items. Trace disbursements for operating expenses from Schedule f to figure 5.
4. Other disbursements include outlays for fixed assets, long-term investments, dividends, and the like. An example is the $3,000 expenditure for new fixtures.

- The total cash increase (decrease) from financing (*z*) depends on the total available cash balance (*x*) and the net cash receipts and disbursements (*y*). If cash available plus net cash receipts less disbursements is negative, borrowing is necessary- figure 5shows that CHC will borrow $14,000 in April to cover the planned deficiency. If cash available plus net cash receipts less disbursements is sufficiently positive, CHC can repay loans-it repays $1,000 and $9,000 in May and June, respectively. This section of the cash budget also generally contains the outlays for interest expense. Trace the calculated interest expense, which in our example is the same as the cash interest payments for the 3 months, to figure 4, which then will be complete.

- The ending cash balance is the beginning cash balance + y + z . Financing, z , has either a positive (borrowing) or a negative (repayment) effect on the cash balance. The illustrative cash budget shows the pattern of short-term, "self-liquidating" financing. Seasonal peaks often result in heavy drains on cash-for merchandise purchases and operating expenses-before the company makes sales and collects cash from customers. The resulting loan is "self-liquidating"-that is, the company uses borrowed money to acquire merchandise for sale, and uses the proceeds from sales to repay the loan. This "working capital cycle" moves from cash to inventory to receivables and back to cash.

Step 3C: Budgeted Balance Sheet

The final step in preparing the master budget is to construct the budgeted balance sheet (figure 6) that projects each balance sheet item in accordance with the business plan as expressed in the previous schedules. Specifically, the beginning balances at March 31 would be increased or decreased in light of the expected cash receipts and cash disbursements in figure 5and in light of the effects of noncash items appearing on the income statement in figure 4. For example, unexpired insurance is a noncash item that would decrease from its balance of $1,800 on March 31 to $1,200 on June 30.

Figure 5

The Cooking Hut Company

Budgeted Balance Sheet

June 30, 20X1

Assets		
Current assets		
Cash (figure 4)	$10,990	
Accounts receivable, net (.4 * June sales of $60,000)	24,000	
Inventory (Schedule c)	48,000	
Unexpired insurance (for July–December)	1,200	$ 84,190
Plant assets		
Equipment, fixtures, and other	$40,000	
Accumulated depreciation	(14,300)	25,700
Total assets		$109,890
Liabilities and Owners' Equity		
Current liabilities		
Accounts payable (0.5 * June purchases of $36,400)	$18,200	
Short-term bank loan	4,000	
Accrued wages and commissions payable (0.5 * 11,500)	5,750	$ 27,950
Owners' equity		81,940
Total liabilities and owners' equity		$109,890

Note: March 31, 20X1 beginning balances are used for computations of unexpired insurance, plant assets, and owners' equity.

Strategy and the Master Budget

The master budget is an important management tool for evaluating and revising strategy. For example, the initial formulation of the budgeted financial statements may prompt management to consider new sales strategies to generate more demand. Alternatively, management may explore the effects of various adjustments in the timing of cash receipts and disbursements. The large cash deficiency in April, for example, may lead to an emphasis on cash sales or an attempt to speed up collection of accounts receivable. In any event, the first draft of the master budget is rarely the final draft. As managers revise strategy, the budgeting process becomes an integral part of the management process itself—budgeting is planning and communicating.

Problems

1. Prepare Master Budget

You are the new manager of the local GreatBuy Electronics store. Top management of GreatBuy Electronics is convinced that management training should include the active participation of store managers in the budgeting process. You have been asked to prepare a complete master budget for your store for June, July, and August. All accounting is done centrally so you have no expert help on the premises.

In addition, tomorrow the branch manager and the assistant controller will be here to examine your work; at that time, they will assist you in formulating the final budget document. The idea is to have you prepare the initial budget on your own so that you gain more confidence about accounting matters. You want to make a favorable impression on your superiors, so you gather the financial statement and sales data as of May 31, 20X8.

Cash	$ 6,600	**Recent and Projected Sales**	
Inventory	151,200	April	$130,000
Accounts receivable	118,300	May	130,000
Net furniture and fixtures	52,000	June	240,000
Total assets	$328,100	July	170,000
Accounts payable	$156,200	August	170,000
Owners' equity	171,900	September	120,000
Total liabilities and owners' equities	$328,100		

Credit sales are 70% of total sales. Seventy percent of each credit account is collected in the month following the sale and the remaining 30% is collected in the subsequent month. Assume that bad debts are negligible and can be ignored. The accounts receivable on May 31 are the result of the credit sales for April and May:

(1.30 *0 .70 * $130,000) + 11.0 * 0.70 * $130,000) = $118,300.

The policy is to acquire enough inventories each month to equal the following month's projected cost of goods sold. All purchases are paid for in the month following purchase.

The average gross profit on sales is 37%. Salaries, wages, and commissions average 24% of sales; all other variable expenses are 3% of sales. Fixed expenses for rent, property taxes, and miscellaneous payroll and other items are $9,000 monthly. Assume that these variable and fixed expenses require cash disbursements each month. Depreciation is $1,000 monthly.

In June, $5,000 is going to be disbursed for fixtures acquired and recorded in furniture and fixtures in May. The May 31 balance of accounts payable includes this amount.

Assume that a minimum cash balance of $4,000 is to be maintained. Also assume that all borrowings are effective at the beginning of the month and all repayments are made at the end of the month of repayment. Interest is compounded and added to the outstanding balance each month, but interest is paid only at the ends of months when principal is repaid. The interest rate is 9% per year; round interest computations and interest payments to the nearest dollar. Interest payments may be any dollar amount, but all borrowing and repayments of principal are made in multiples of $1,000.

Required:

A. Prepare a budgeted income statement for the coming June–August quarter, a cash budget for each of the 3 months, and a budgeted balance sheet for August 31, 20X8. All operations are evaluated on a before-income-tax basis, so income taxes may be ignored here.

B. Explain why there is a need for a bank loan and what operating sources supply cash for repaying the bank loan.

2. Prepare Master Budget

Flying Fish Kite Company, a small Woy Woy, Australia, firm that sells kites on the Web, wants a master budget for the 3 months beginning January 1, 20X2. It desires an ending minimum cash balance of $15,000 each month. Sales are forecasted at an average wholesale selling price of $14 per kite. Merchandise costs average $5 per kite. All sales are on credit, payable within 30 days, but experience has shown that 40% of current sales are collected in the current month, 10% in the next month, and 50% in the month thereafter. Bad debts are negligible.

In January, Flying Fish Kite is beginning just-in-time (JIT) deliveries from suppliers, which means that purchases will equal expected sales. On January 1, purchases will cease until inventory decreases to $22,000, after which time purchases will equal sales. Purchases during any given month are paid in full during the following month. Monthly operating expenses are as follows:

Wages and salaries	$80,000
Insurance expired	450
Depreciation	900
Miscellaneous	4,000
Rent	$500/month + 5% of quarterly sales over $50,000

Cash dividends of $2,400 are to be paid quarterly, beginning January 15, and are declared on the fifteenth of the previous month. All operating expenses are paid as incurred, except insurance, depreciation, and rent. Rent of $500 is paid at the beginning of each month, and the additional 5% of sales is settled quarterly on the tenth of the month following the end of the quarter. The next rent settlement date is January 10.

The company plans to buy some new fixtures for $4,000 cash in March.

Money can be borrowed and repaid in multiples of $2,000. Management wants to minimize borrowing and repay rapidly. Simple interest of 9% per annum is computed monthly but paid when the principal is repaid. Assume that borrowing occurs at the beginning, and repayments at the end, of the months in question. Compute interest to the nearest dollar.

Assets as of December 31, 20X1		**Liabilities and Owners' Equities as of December 31, 20X1**	
Cash	$ 30,000	Accounts payable (merchandise)	$151,500
Accounts receivable	180,600	Dividends payable	2,400
Inventory*	153,000	Rent payable	27,950
Unexpired insurance	5,400	Owners' equity	249,150
Fixed assets, net	62,000		$431,000
	$431,000		
*November 30 inventory balance = $59,000.			

Recent and forecasted sales:

October	$280,000	December	$161,000	February	$413,000	April	$280,000
November	168,000	January	378,000	March	273,000		

Required:

A. Prepare a master budget including a budgeted income statement, balance sheet, cash budget, and supporting schedules for the months January–March 20X2.

B. Explain why there is a need for a bank loan and what operating sources provide the cash for the repayment of the bank loan.

3. **Cash Budgeting**

Blake and Anna Carlson are preparing a plan to submit to venture capitalists to fund their business, Music Masters. The company plans to spend $380,000 on equipment in the first quarter of 20X7. Salaries and other operating expenses (paid as incurred) will be $35,000 per month beginning in January 20X7 and will continue at that level thereafter.

The company will receive its first revenues in January 20X8, with cash collections averaging $30,000 per month for all of 20X8. In January 20X9, cash collections are expected to increase to $100,000 per month and continue at that level thereafter.

Assume that the company needs enough funding to cover all its cash needs until cash receipts start exceeding cash disbursements.

Required: How much venture capital funding should Blake and Anna seek?

4. Purchases and Cost of Goods Sold

Popeil Products, a wholesaler of fishing equipment, budgeted the following sales for the indicated months:

	June 20X8	July 20X8	August 20X8
Sales on account	$1,850,000	$1,920,000	$1,910,000
Cash sales	130,000	156,000	274,000
Total sales	$1,980,000	$2,076,000	$2,184,000

All merchandise is marked up to sell at its invoice cost plus 20%. Target merchandise inventories at the beginning of each month are 25% of that month's projected cost of goods sold.

Required:

A. Compute the budgeted cost of goods sold for the month of June 20X8.

B. Compute the budgeted merchandise purchases for July 20X8.

5. Purchases and Sales Budgets

All sales of Tracy's Jeans and Uniforms (TJU) are made on credit. Sales are billed twice monthly, on the fifth of the month for the last half of the prior month's sales and on the twentieth of the month for the first half of the current month's sales.

For accounts paid within the first 10 days after the billing date, TJU gives customers a 2% discount; otherwise the full amount is due within 30 days of the billing date, and customers that do not pay within the 10-day discount period generally wait the full 30 days before making payment. Based on past experience, the collection experience of accounts receivable is as follows:

Within the 10-day discount period	70%
At 30 days after billing	28%
Uncollectible	2%

Sales for May 20X8 were $790,000. The forecast sales for the next 4 months are as follows:

June	$810,000
July	990,000
August	940,000
September	660,000

TJU's average markup on its products is 40% of the sales price.

TJU purchases merchandise for resale to meet the current month's sales demand and to maintain a desired monthly ending inventory of 25% of the next month's cost of goods sold. All purchases are on credit. TJU pays for one-half of a month's purchases in the month of purchase and the other half in the month following the purchase.

All sales and purchases occur uniformly throughout the month.

Required:

A. How much cash can TJU plan to collect from accounts receivable collections during July 20X8?
B. Compute the budgeted dollar value of TJU inventory on May 31, 20X8.
C. How much merchandise should TJU plan to purchase during June 20X8?
D. How much should TJU budget in August 20X8 for cash payments for merchandise purchased?

6. Sales Budget

Suppose a lumber yard has the following data:

- Accounts receivable, May 31: (0.2 * May sales of $360,000) = $72,000
- Monthly forecasted sales: June, $437,000; July, $441,000; August, $502,000; September, $531,000
- Sales consist of 80% cash and 20% credit. All credit accounts are collected in the month following the sales. Uncollectible accounts are negligible and may be ignored.

Required: Prepare a sales budget schedule and a cash collections budget schedule for June, July, and August.

7. Sales Budget

A Sendai clothing wholesaler was preparing its sales budget for the first quarter of 20X8. Forecast sales are as follows (All values are in thousands of yen).

January	¥203,000
February	¥227,000
March	¥248,000

Sales are 40% cash and 60% on credit. Fifty-fi ve percent of the credit accounts are collected in the month of sale, 35% in the month following the sale, and 10% in the following month. No uncollectible accounts are anticipated. Accounts receivable at the beginning of 20X8 are ¥82,950 (10% of November credit sales of ¥150,000 and 45% of December credit sales of ¥151,000).

Required: Prepare a schedule showing sales and cash collections for January, February, and March, 20X8.

8. Cash Collection Budget

Northwest Equipment offers a 3% discount to customers who pay cash at the time of sale and a 2% discount to customers who pay within the first 10 days of the month after sale. Past experience shows that cash collections from customers tend to occur in the following pattern:

Cash collected at time of sale	55%
Collected within cash discount period in first 10 days of month after sale	15
Collected after cash discount period in first month after month of sale	10
Collected after cash discount period in second month after month of sale	15
Never collected	5

Required: Compute the total cash budgeted to be collected in March if sales forecasts are $370,000 for January, $420,000 for February, and $460,000 for March.

9. Purchases Budget

Green Lighting Supply plans inventory levels (at cost) at the end of each month as follows: May, $271,000; June, $226,000; July, $209,000; and August, $241,000.

Sales are expected to be June, $449,000; July, $359,000; and August, $306,000. Cost of goods sold is 65% of sales.

Purchases in April were $258,000 and in May they were $188,000. Payments for each month's purchases are made as follows: 15% during that month, 70% the next month, and the final 15% the next month.

Required: Prepare budget schedules for June, July, and August for purchases and for disbursements for purchases.

10. Purchases Budget

Leimersheim GmbH has adopted the following policies regarding merchandise purchases and inventory.

At the end of any month, the inventory should be €15,000 plus 90% of the cost of goods to be sold during the following month. The cost of merchandise sold averages 60% of sales. Purchase terms are generally net, 30 days. A given month's purchases are paid as follows: 20% during that month and 80% during the following month.

Purchases in May had been €150,000 and the inventory on May 31 was higher than planned at €230,000. The manager was upset because the inventory was too high. Sales are expected to be June, €300,000; July, €290,000; August, €340,000; and September, €400,000.

Required:

A. Compute the amount by which the inventory on May 31 exceeded the company's policies.

B. Prepare budget schedules for June, July, and August for purchases and for disbursements for purchases.

11. Cash Budget

Consider the budgeted income statement for Carlson Company for June 20X4.

Sales		$ 290
Inventory, May 31	$ 50	
Purchases	192	
Available for sale	242	
Inventory, June 30	40	
Cost of goods sold		202
Gross margin		$ 88
Operating expenses		
Wages	$ 36	
Utilities	5	
Advertising	10	
Depreciation	1	
Office expenses	4	
Insurance and property taxes	3	59
Operating income		$ 29

- The cash balance, May 31, 20X4, is $15,000.
- Sales proceeds are collected as follows: 80% the month of sale, 10% the second month, and 10% the third month.
- Accounts receivable are $44,000 on May 31, 20X4, consisting of $20,000 from April sales and $24,000 from May sales.
- Accounts payable on May 31, 20X4, are $145,000.
- Carlson Company pays 25% of purchases during the month of purchase and the remainder during the following month.
- All operating expenses requiring cash are paid during the month of recognition, except that insurance and property taxes are paid annually in December for the forthcoming year.

Required: Prepare a cash budget for June. Confine your analysis to the given data. Ignore income taxes.

12. Cash Budget

Daniel Merrill is the manager of an airport gift shop, Merrill News and Gifts. From the following data,

Mr. Merrill wants a cash budget showing expected cash receipts and disbursements for the month of April, and the cash balance expected as of April 30, 20X7.

- Planned cash balance, March 31, 20X7: $100,000
- Customer receivables as of March 31: $530,000 total, $80,000 from February sales, $450,000 from March sales
- Accounts payable, March 31: $460,000

- Merchandise purchases for April: $450,000, 40% paid in month of purchase, 60% paid in next month
- Payrolls due in April: $90,000
- Other expenses for April, payable in April: $45,000
- Accrued taxes for April, payable in June: $7,500
- Bank note due April 10: $90,000 plus $7,200 interest
- Depreciation for April: $2,100
- Two-year insurance policy due April 14 for renewal: $1,500, to be paid in cash
- Sales for April: $1,000,000, half collected in month of sale, 40% in next month, 10% in third month

Required: Prepare the cash budget for the month ending April 30, 20X7.

13. Cash Budget

Prepare a statement of estimated cash receipts and disbursements for October 20X7 for the Herbal Magic Company, which sells one product, herbal soap, by the case. On October 1, 20X7, part of the trial balance showed the following:

	Dr	Cr
Cash	$ 5,000	
Accounts receivable	15,620	
Allowance for bad debts		$2,100
Merchandise inventory	12,240	
Accounts payable, merchandise		7,280

The company pays for its purchases within 10 days of purchase, so assume that one-third of the purchases of any month are due and paid for in the following month.

The cost of the merchandise purchased is $12 per case. At the end of each month, it is desired to have an inventory equal in units to 60% of the following month's sales in units.

Sales terms include a 3% discount if payment is made by the end of the calendar month. Past experience indicates that 70% of sales will be collected during the month of the sale, 20% in the following calendar month, 5% in the next following calendar month, and the remaining 5% will be uncollectible. The company's fiscal year begins August 1.

Unit selling price……..	$ 22
August actual sales…….	$ 8,800
September actual sales……	44,000
October estimated sales…….	37,400
November estimated sales……	19,800
Total sales expected in the fiscal year……..	$528,000

Exclusive of bad debts, total budgeted selling and general administrative expenses for the fiscal year are estimated at $84,600, of which $27,000 is fixed expense (which includes a $12,900 annual depreciation charge). The Herbal Magic Company incurs these fixed expenses uniformly throughout the year. The balance of the selling and general administrative expenses varies with sales. Expenses are paid as incurred.

Bubble Answer Sheet

(A) (B) (C) (D)

1. (A) (B) (C) (D)	18. (A) (B) (C) (D)	35. (A) (B) (C) (D)
2. (A) (B) (C) (D)	19. (A) (B) (C) (D)	36. (A) (B) (C) (D)
3. (A) (B) (C) (D)	20. (A) (B) (C) (D)	37. (A) (B) (C) (D)
4. (A) (B) (C) (D)	21. (A) (B) (C) (D)	38. (A) (B) (C) (D)
5. (A) (B) (C) (D)	22. (A) (B) (C) (D)	39. (A) (B) (C) (D)
6. (A) (B) (C) (D)	23. (A) (B) (C) (D)	40. (A) (B) (C) (D)
7. (A) (B) (C) (D)	24. (A) (B) (C) (D)	41. (A) (B) (C) (D)
8. (A) (B) (C) (D)	25. (A) (B) (C) (D)	42. (A) (B) (C) (D)
9. (A) (B) (C) (D)	26. (A) (B) (C) (D)	43. (A) (B) (C) (D)
10. (A) (B) (C) (D)	27. (A) (B) (C) (D)	44. (A) (B) (C) (D)
11. (A) (B) (C) (D)	28. (A) (B) (C) (D)	45. (A) (B) (C) (D)
12. (A) (B) (C) (D)	29. (A) (B) (C) (D)	46. (A) (B) (C) (D)
13. (A) (B) (C) (D)	30. (A) (B) (C) (D)	47. (A) (B) (C) (D)
14. (A) (B) (C) (D)	31. (A) (B) (C) (D)	48. (A) (B) (C) (D)
15. (A) (B) (C) (D)	32. (A) (B) (C) (D)	49. (A) (B) (C) (D)
16. (A) (B) (C) (D)	33. (A) (B) (C) (D)	50. (A) (B) (C) (D)
17. (A) (B) (C) (D)	34. (A) (B) (C) (D)	

Bubble Answer Sheet

A B C D

1. A B C D	18. A B C D	35. A B C D
2. A B C D	19. A B C D	36. A B C D
3. A B C D	20. A B C D	37. A B C D
4. A B C D	21. A B C D	38. A B C D
5. A B C D	22. A B C D	39. A B C D
6. A B C D	23. A B C D	40. A B C D
7. A B C D	24. A B C D	41. A B C D
8. A B C D	25. A B C D	42. A B C D
9. A B C D	26. A B C D	43. A B C D
10. A B C D	27. A B C D	44. A B C D
11. A B C D	28. A B C D	45. A B C D
12. A B C D	29. A B C D	46. A B C D
13. A B C D	30. A B C D	47. A B C D
14. A B C D	31. A B C D	48. A B C D
15. A B C D	32. A B C D	49. A B C D
16. A B C D	33. A B C D	50. A B C D
17. A B C D	34. A B C D	

Answer the following questions:

Question one (40 Marks/ 60 minutes):

First (20 Marks/ 30 minutes):

The new Manager of South Valley Manufacturing Co. has asked for a variety of information about the operations of the firm from last year. The manager is given the following information, but with some data missing:

Total sales revenue	?
Number of units produced and sold	500,000 units
Selling Price	?
Operating Income	180,000
Variable Cost per unit	$ 4
Fixed Costs for the Year	$2,500,000

Required:

1. Find (a) total sales revenue, (b) selling price, and (c) markup percentage based on full cost for this product.

2. The new manager has a plan to reduce fixed costs by $225,000 and variable costs by $0.30 per unit while continuing to produce and sell

500,000 units. Using the same markup percentage as in requirement 1, calculate the new selling price.

3. Assume the manager introduces the changes in requirement 2 including the new selling price. However, the reduction in variable cost has resulted in lower product quality resulting in 5% fewer units being sold compared with before the change. Calculate operating income (loss).

Second (20 Marks / 30 minutes):

Imperial Jewelers is considering a special order for 100 handcrafted gold rings to be given as gifts to members of a wedding party. Imperial Jewelers nromally sells 2000 rings every year for $190 per ring and its unit product cost is $149 as shown below:

Direct materials	$ 84
Direct labor	45
Manufacturing overhead	20
Unit product cost	$149

Most of the manufacturing overhead is fixed and unaffected by variations in how much jewelry is produced in any given period. However, $4 of the overhead is variable with respect to the number of rings produced. The customer who is interested in the special rings order would like to write special letters on the rings. This would require additional materials costing

$2 per ring and would also require acquisition of a special tool costing $250 that would have no other use once the special order is completed. This order would have no effect on the company's regular sales and the order could be fulfilled using the company's existing capacity without affecting any other order. The special offer price is $170 per ring.

Required

1- Using the contribution-margin technique, prepare an aanlysis to show the effect of special order. Use four columns: without special order, the effect of special order (one column total and one per unit), and totals with the special order?

2- Suppose you are the manager of Imperial Jewelers, would you accept this offer?

3- List two qualitative factors that may affect your decision- one factor supporting acceptance of the offer and one factor supporting the rejection of the offer?

Question Two (30 Marks/ 50 minutes)

El-Qenawy Co. produces Part A36 that is used in its products. Currently the company uses 60,000 units of Part A36. The present cost to manufacture one unit of Part A36 is given below (based on 60,000 units per year):

Direct materials ..... ….10.35

Direct labor 6.00

Variable overhead 1.50

Fixed overhead (2.80 general company overhead, 1.60 depreciation and,0.75 supervision) …….. 5.15

Total cost per unit. 23.00

The equipment used to produce Part A36 is completely worn out and depreciated and cannot be used anymore. The company has two alternatives regarding Part A36:

Alternative 1: Rent new equipment and continue to make the part. The equipment would be rented for $135,000 per year.

Alternative 2: Purchase Part A36 from an outside supplier at $18 per unit.

The new equipment would be more efficient than the equipment that El-Qenawy Co. has been using and, according to the manufacturer, would reduce direct labor and variable overhead costs by 30%. The old equipment has no resale value. Supervision cost ($45,000 per year) and direct materials cost per unit would not be affected by the new

equipment. The new equipment's capacity would be 90,000 units per year.

The company's total general company overhead would be unaffected by this decision.

Required:

1- Prepare an analysis showing the total cost and the cost per unit of Part A36 for each of the two alternatives given above. Assume that 60,000 units are needed each year. Which course of action would you recommend to El-Qenawy Co.?

2- Would your recommendation in (1) above be the same if the company's needs were: (a) 75,000 units per year or (b) 90,000 units per year? Show computations to support your answer, with costs presented on both a total and a per unit basis.

Question Four (30 Marks/ 40 minutes)

The following information was extracted from the records of a book shop. Planned cash balance, April 2014: L.E.100,000; Customer receivables as of April 30: L.E.530,000, where L.E.80,000 from March sales and L.E.450,000 from April sales; Accounts payable April 30, L.E.460,000; Merchandise purchased for May: L.E.450,000, 40% paid in month of purchase, 60% paid in the following month; Payrolls due in May:

L.E.90,000; Other expenses for May, payable in May L.E.45,000; Accrued taxes for May, payable in July L.E.7,500; Bank note due May 10 L.E.90,000 plus L.E.7,200 interest; Depreciation for May L.E.2,100; Two-year insurance policy due May 14 for renewal L.E.1,500, to be paid in cash; Sales for May L.E.1,000,000, half collected in month of sale, 40% in next month and 10% in the third month.

Required

Prepare the cash budget for the month ending May 31, 2014.