Pricing and Profitability Analysis

CHAPTER 19

AFTER STUDYING THIS CHAPTER, YOU SHOULD BE ABLE TO:

1. Discuss basic pricing concepts.
2. Calculate a markup on cost and a target cost.
3. Discuss the impact of the legal system and ethics on pricing.
4. Explain why firms measure profit, and calculate measures of profit using absorption and variable costing.
5. Determine the profitability of segments.
6. Compute the sales price, price volume, contribution margin, contribution margin volume, sales mix, market share, and market size variances.
7. Discuss the variations in price, cost, and profit over the product life cycle.
8. Describe some of the limitations of profit measurement.

Henry Ford once said, "A business that does not make a profit for the buyer of a commodity, as well as for the seller, is not a good business. Buyer and seller must both be wealthier in some way as a result of a transaction, else the balance is broken."[1] Henry Ford's comment reminds us that the relationship between buyer and seller is an exchange relationship. Both expect to profit from it. But what is profit? How do we measure it? Since profit is the difference between revenues and costs, we must examine both parts of the expression. Price and revenue will be discussed first. Then, we will look at profit—the interplay of price and cost.

1. Henry Ford, *Today and Tomorrow* (Portland, OR: Productivity Press, 1926, reprinted in 1988).

Basic Pricing Concepts

OBJECTIVE 1
Discuss basic pricing concepts.

One of the more difficult decisions faced by a company is pricing. The accountant is frequently the primary resource the firm turns to when financial data are needed, whether that information relates to cost or to price. As a consequence, accountants must be familiar with sources of revenue data as well as the economic and marketing concepts needed to interpret those data.

Demand and Supply

In general, customers want high-quality goods and services at a low price. Although customer demand is studied in detail in marketing classes, accountants need to be cognizant of demand, especially as demand interacts with supply.

All else being equal, customers will buy more at lower prices and less at higher prices. Producers, on the other hand, are willing (and able) to supply more at higher prices than they can at lower prices. The market-clearing or equilibrium price is located at the intersection of the supply and demand curves. It is the price for which the amount that producers are willing to supply just equals the amount that consumers demand. Note that if firms charge a price that is higher than the market-clearing price, demand falls short of supply. Producers see inventories piling up as consumers buy other goods. If the price is lower than the market-clearing price, everything that is produced is bought. Shortages and backlogs occur. This is a signal to increase production and/or to raise prices.

Factors other than price that influence demand include consumer income, quality of goods offered for sale, availability of substitutes, demand for complementary goods, whether the good is a necessity or a luxury, and so on. However, the basic demand-supply relationship remains, and producers know that raising prices almost inevitably results in less sold. Price elasticity and market structure are two factors that influence the degree of freedom companies have to adjust price.

Price Elasticity of Demand

Since price affects quantity sold, producers want to know just how much a price change will change quantity demanded. In general, **elastic demand** for a good means that a price increase (decrease) of a certain percent lowers (raises) the quantity demanded by more than that percentage. The opposite holds for **inelastic demand**, which occurs when a price change of a certain percent is associated with a quantity change of less than that percent. To apply elasticity concepts, we must analyze the characteristics of goods and services that are more or less elastic.

Goods that are price elastic tend to have many substitutes, are not necessities, and take a relatively large amount of consumer income. The demand for movie tickets, restaurant meals, and automobiles is relatively elastic.

Price-inelastic goods have few substitutes, are necessities, or constitute a relatively small percentage of consumer income. Prescription drugs, electricity, and local telephone service are examples of price-inelastic goods.

Ideally, a company could charge different prices to different customers according to their individual demands for the product. In practice, it is difficult to determine each customer's demand. In addition, it can be very expensive to implement differential pricing. Most retail stores in the United States, for example, mark the price on each item, and no negotiation is permitted. This results in the same price being charged to all customers regardless of their incomes or need for the good. The advantage is that relatively lower personnel costs are incurred; sales clerks need not haggle with each customer.

In other industries, the pricing policy is based on excess capacity and differing elasticities of demand; a higher price is charged to the core market and lower prices to sec-

ondary markets. In order for this to work, there must be no arbitrage. **Arbitrage** occurs when the customers who purchase the good at the lower price are able to resell it to other customers.

For example, airlines define their core market as business travelers. These travelers have inelastic demand for air travel. They need the flexibility to purchase tickets at the last minute, to change reservations, and to fly during the work week. Vacationers, on the other hand, have relatively elastic demand for air travel. A low price is the main attraction. If the airlines could fill their planes with full-fare business travelers, they would. However, there are not enough business travelers to completely fill the planes. In addition, the marginal cost of filling an empty seat on a plane is very low. This explains the airlines' convoluted pricing schemes. Full fares are charged for tickets purchased at the time of need and for travel during the work week. Lower prices are charged for tickets purchased seven to 21 days in advance that include a Saturday night stayover—a condition few business travelers can (or want to) meet. Of course, elasticity of demand is just one factor that influences price. Another important determinant of price is market structure.

Market Structure and Price

Market structure affects price, as well as the costs necessary to support that price. In general, there are four types of market structure: perfect competition, monopolistic competition, oligopoly, and monopoly. These markets differ according to the number of buyers and sellers, the degree of uniqueness of the product, and the relative ease of entry by firms into and out of the market (i.e., barriers to entry).

The **perfectly competitive market** has many buyers and sellers—no one of which is large enough to influence the market—a homogeneous product, and easy entry into and exit from the industry. Firms in a perfectly competitive market cannot charge a higher price than the market price because no one would buy their product, and they will not set a lower price because they can sell all they can produce at the market price.

At the opposite extreme is a monopoly. In a **monopoly**, barriers to entry are so high that there is only one firm in the market. As a result, the product is unique. This setting allows the monopolistic firm to be a price setter. However, just because the monopolist sets the price does not mean it can force consumers to buy. It does mean that a somewhat higher price (with concomitantly lower quantity sold) can be set than would be set in a competitive market. Some monopolies have legally enforced barriers to entry (e.g., the **United States Post Office**). Other firms are monopolies because of patent protection, specialized knowledge, or exceptionally high-cost production equipment. Pharmaceutical companies have a monopoly on new drugs due to patent protection. When the patent expires, generic drug companies can produce it, and the price of the drug plummets.

Monopolistic competition has characteristics of both monopoly and perfect competition, but it is much closer to the competitive situation. Basically, there are many sellers and buyers, but the products are differentiated on some basis. Restaurants are good examples of monopolistic competitors. Each restaurant serves food but attempts to differentiate itself in some way—ethnic style of food, closeness to work or schools, availability of a party room, gourmet versus casual atmosphere, and so on. The end result is to slightly raise prices above the perfectly competitive price, as customers agree to pay a little more for the unique feature that appeals to them.

An **oligopoly** is characterized by a few sellers. Typically, barriers to entry are high, and they are usually cost related. For example, the cereal industry is dominated by **Kellogg's**, **General Mills**, and **Quaker Oats**. The reason is not the high cost of manufacturing corn flakes. Instead, the huge selling expenditures (e.g., advertising and shelf space fees) of the big three effectively prevent smaller companies from entering the market. The oligopolist has some market power to set price, but it constantly must be aware

of its competitors' actions. Often, there is a price leader, which sets a price that the others follow. The price leader may raise prices and see if the others follow suit. If they do not, the first firm, no longer a leader, typically reduces price immediately.

The various types of market structure and their characteristics are summarized in Exhibit 19-1. Companies need to be aware of the market structure in which they operate in order to understand their pricing options. Note that these market structures also have implications for the supply or cost side. The firm in the perfectly competitive industry has lower marketing costs (advertising, positioning, discounting, coupons) than the firm in the monopolistically competitive industry, which must constantly reinforce the consumer's perception that it has a unique product. The monopolist need not incur high costs to remind consumers of its unique product. However, it typically incurs expenses while protecting its monopoly position, often through legal fees and lobbying (included in administrative expenses).

EXHIBIT 19-1 Characteristics of the Four Basic Types of Market Structure

Market Structure Type	Number of Firms in Industry	Barriers to Entry	Uniqueness of Product	Expenses Related to Structure Type
Perfect competition	Many	Very low	Not unique	No special expenses
Monopolistic competition	Many	Low	Some unique features	Advertising, coupons, costs of differentiation
Oligopoly	Few	High	Fairly unique	Costs of differentiation, advertising, rebates, coupons
Monopoly	One	Very high	Very unique	Legal and lobbying expenditures

Pricing Policies

OBJECTIVE 2
Calculate a markup on cost and a target cost.

Companies use various strategies to set price. Since cost is an important determinant of supply and known to the producer, many companies base price on cost. Still other companies use a target-costing strategy, or strategies based on the initial conditions in the market.

Cost-Based Pricing

Demand is one side of the pricing equation; supply is the other side. Since revenue must cover cost for the firm to make a profit, many companies start with cost to determine price. That is, they calculate product cost and add the desired profit. The mechanics of this approach are straightforward. Usually, there is some cost base and a markup. The **markup** is a percentage applied to base cost; it includes desired profit and any costs not included in the base cost. Companies that bid for jobs routinely base bid price on cost.

Consider AudioPro Company, owned and operated by Chris Brown, which sells and installs audio equipment in homes, cars, and trucks. Costs of the components and other direct materials are easy to trace. Direct labor cost is similarly easy to trace to each job. Assemblers receive, on average, $12 per hour. Last year, AudioPro Company incurred $73,500 of direct labor cost. Overhead, consisting of utilities, small tools, building space, and so on, amounted to $49,000. AudioPro's income statement for last year is as follows:

Revenues		$350,350
Cost of goods sold:		
Direct materials	$122,500	
Direct labor	73,500	
Overhead	49,000	245,000
Gross profit		$105,350
Selling and administrative expenses		25,000
Operating income		$ 80,350

Suppose that Chris wants to earn about the same amount of profit on each job as was earned last year. She could calculate a markup on cost of goods sold by summing selling and administrative expenses and operating income and dividing by cost of goods sold.

$$\begin{aligned}\text{Markup on COGS} &= (\text{Selling and administrative expenses} + \text{Operating income})/\text{COGS}\\ &= (\$25{,}000 + \$80{,}350)/\$245{,}000\\ &= 0.43\end{aligned}$$

The markup on cost of goods sold is 43 percent. Notice that the 43 percent markup covers both profit and selling and administrative cost. The markup is not pure profit.

The markup can be calculated using a variety of bases. Clearly, for AudioPro Company, the cost of purchased materials is the largest component. Last year, direct materials were greater than any of the other costs or profit.

$$\begin{aligned}\text{Markup on direct materials} &= (\text{Direct labor} + \text{Overhead} + \text{Selling and administrative expenses} + \text{Operating income})/\text{Direct materials}\\ &= (\$73{,}500 + \$49{,}000 + \$25{,}000 + \$80{,}350)/\$122{,}500\\ &= 1.86\end{aligned}$$

A markup percentage of 186 percent of direct materials cost would also yield the same amount of profit, assuming the level of operations and other expenses remained stable. The choice of base and markup percentage generally rests on convenience. If Chris finds that the labor varies in rough proportion to the cost of materials (e.g., more expensive components take more time to set up) and that the cost of materials is easier to track than the cost of goods sold, then materials might be the better base.

To see how the markup can be used in pricing, suppose that Chris wants to expand her company's product line to include automobile alarm systems and electronic remote car door openers. She estimates the following costs for the sale and installation of one electronic remote car door opener.

Direct materials (components and two remote controls)	$ 40.00
Direct labor (2.5 hours × $12)	30.00
Overhead (65% of direct labor cost)	19.50
Estimated cost of one job	$ 89.50
Plus: 43% markup on COGS	38.49
Bid price	$127.99

Thus, AudioPro's initial price is about $128. Note that this is just the first pass at a price. Chris can adjust the price based on her knowledge of competition for this type of job and other factors. The markup is a guideline, not an absolute rule.

If AudioPro Company actually sets this price, is it guaranteed to make a profit? No, not at all. If very few jobs are won, the entire markup will go toward selling and administrative expenses, the costs not explicitly included in the pricing calculations.

Markup pricing is often used by retail stores, and their typical markup is 100 percent of cost. Thus, if a sweater is purchased by Graham Department Store for $24, the retail price marked is $48 [$24 + (1.00)($24)]. Of course, the 100 percent markup is

not pure profit; it goes toward the salaries of the clerks, payment for space and equipment (cash registers, etc.), utilities, advertising, and so on. A major advantage of markup pricing is that standard markups are easy to apply. Consider the difficulty of setting a price for every piece of merchandise in a store. For example, **Pottery Barn** stocks a wide variety of goods, from glassware and pottery to furniture and textiles. Pricing each item by assessing its supply and demand characteristics would be far too time consuming. It is much simpler to apply a uniform markup to cost and then adjust prices as needed if less is demanded than anticipated.

Target Costing and Pricing

Most American companies, and nearly all European firms, set the price of a new product as the sum of the costs and the desired profit. The rationale is that the company must earn sufficient revenues to cover all costs and yield a profit. Peter Drucker writes, "This is true but irrelevant: Customers do not see it as their job to ensure manufacturers a profit. The only sound way to price is to start out with what the market is willing to pay."[2]

Target costing is a method of determining the cost of a product or service based on the price (target price) that customers are willing to pay. The marketing department determines what characteristics and price for a product are most acceptable to consumers. Then, it is the job of the company's engineers to design and develop the product such that cost and profit can be covered by that price. Japanese firms have been doing this for years; American companies are beginning to use target costing.

Retail stores employ target costing when they look for goods that can be priced at a particular level to appeal to customers. For example, many department stores work with clothing companies to develop house labels. The house label goods are typically good quality items that cost less and are priced lower than comparable name brand items. The house label gives the store flexibility. The store is not in the business of manufacturing sweaters, but it can find a source to deliver sweaters of particular quality for the cost that will allow the store to achieve a target price and profit.

Let's return to the AudioPro Company example. Suppose Chris finds that other aftermarket audio installers price the remote car door opener at $110. Should she drop her plans to expand into this product line? No, not if she can tailor her price to the market price. Recall that the original price called for $40 of direct materials and $30 of direct labor. Perhaps Chris could offer one remote device instead of two, saving $5 in cost. In addition, she might be able to shave one half hour off the direct labor, once the workers are trained and able to work more efficiently. This would result in $6 of savings. Prime cost would be $59 ($40 − $5 + $30 − $6) instead of the original $70.

Recall that AudioPro Company applies overhead at the rate of 65 percent of direct labor cost. However, Chris must think carefully about this job. Perhaps somewhat less overhead will be incurred because purchasing is reduced. (Only one reliable supplier is needed, and the tools and facilities can be shared with the audio installation.) Perhaps overhead for this job will amount to $12 (50 percent of direct labor). That would make the cost of one job $71 ($35 + $24 + $12).

Now, if the standard markup of 43 percent is applied, the price would be $101.53, well within the other firms' price of $110. As you can see, target costing is an iterative process. Chris will go through the cycle until she either achieves the target cost or determines that she cannot. Note, however, that target costing has given Chris a chance to develop a profitable market; a chance she might not have had if the original cost-based price had been set.

Target costing involves much more upfront work than cost-based pricing. However, additional work must be done if the cost-based price turns out to be higher than

2. Peter Drucker, "The Five Deadly Business Sins," *The Wall Street Journal* (October 21, 1993): A22.

what customers will accept. Then, the arduous task of bringing costs into line to support a lower price, or the opportunity cost of missing the market altogether, begins.

Other Pricing Policies

Target costing is also effectively used in conjunction with marketing decisions to engage in price skimming or penetration pricing. **Penetration pricing** is the pricing of a new product at a low initial price, perhaps even lower than cost, to build market share quickly. This is useful when the product or service is new and customers have great uncertainty as to its value. We must distinguish penetration pricing from predatory pricing. The important difference is the intent. The penetration price is not meant to destroy competition. Accountants, lawyers, and other professionals with new practices often use penetration pricing to establish a customer base.

Price skimming means that a higher price is charged when a product or service is first introduced. In essence, the company skims the cream off the market. It is used most effectively when the product is new, a small group of consumers values it, and the company enjoys a monopolistic advantage. Companies that engage in price skimming are hoping to recoup the expenses of research and development through high initial pricing. A cost consideration is that, in the start-up phase of production, economies of scale and learning effects have not occurred. For example, in the late 1960s, **Hewlett-Packard** produced hand-held calculators. These were truly novel and very expensive. Priced at over $400, only scientists and engineers, who used the calculators in their work, felt the need for this product. As the market for hand-held calculators grew and technology improved, economies of scale kicked in, and the cost and price dropped dramatically. By the 1980s, tiny solar calculators were given away as enticements to new subscribers of magazines.

Closely related to skimming is price gouging. **Price gouging** is said to occur when firms with market power price products "too high." How high is too high? Surely, cost is a consideration. Any time price just covers cost, gouging does not occur. This is why many firms go to considerable trouble to explain their cost structure and point out costs that consumers may not realize exist. Pharmaceutical companies, for example, emphasize the research and development costs associated with new drugs. When a high price is not clearly supported by cost, buyers take offense.

OBJECTIVE 3

Discuss the impact of the legal system and ethics on pricing.

The Legal System and Pricing

While demand and supply are important determinants of price, government also has an important impact on pricing. Over time, many laws have been passed regulating the level and way in which firms can set prices. The basic principle behind much pricing regulation is that competition is good and should be encouraged. Therefore, collusion by companies to set prices and the deliberate attempt to drive competitors out of business are prohibited.

Predatory Pricing

Predatory pricing is the practice of setting prices below cost for the purpose of injuring competitors and eliminating competition. It is important to note that pricing below cost is not necessarily predatory pricing. Companies frequently price an item below cost, by running weekly specials in a grocery store, or practicing penetration pricing, for example. State laws on predatory pricing create a patchwork of legal definitions. Twenty-two states have laws against predatory pricing, each differing somewhat in definition and rules.

For example, three Conway, Arkansas, drugstores filed suit against **Wal-Mart**.[3] The druggists contended that Wal-Mart engaged in predatory pricing by selling more than

3. Wal-Mart lost the suit in October 1993 but won on appeal.

100 products below cost. One difficulty is showing exactly what cost is. Wal-Mart has low overhead and phenomenal buying power. Suppliers are regularly required to shave prices to win Wal-Mart's business. Smaller concerns cannot win such price breaks. Thus, the fact that Wal-Mart prices products below competitors' costs does not necessarily mean that those products are priced below Wal-Mart's cost. (Although in this case, the CEO of Wal-Mart did concede that Wal-Mart on occasion prices products below its own cost.) More importantly, if predatory pricing is truly taking place, the below-cost price must be for the purpose of driving out competitors, a difficult point to prove. In general, states follow federal law in predatory pricing cases, and federal law makes it difficult to prove predatory pricing, since price competition is so highly valued.

Predatory pricing on the international market is called **dumping**, which occurs when companies sell below cost in other countries, and domestic industry is injured. For years, U.S. steel manufacturers have accused Japanese, Russian, and Brazilian companies of dumping. Companies found guilty of dumping products in the United States are subject to trade restrictions and stiff tariffs—which act to increase the price of the good. The defense against a charge of dumping is demonstrating that the price is indeed above or equal to costs, or that domestic industry is unhurt.[4]

Price Discrimination

The Robinson-Patman Act was passed in 1936 as a means of outlawing price discrimination.[5] **Price discrimination** refers to the charging of different prices to different customers for essentially the same product. A key feature of the Robinson-Patman Act is that only manufacturers or suppliers are covered by the act; services and intangibles are not included.

Importantly, the Robinson-Patman Act does allow price discrimination under certain specified conditions: (1) if the competitive situation demands it and (2) if costs (including costs of manufacture, sale, or delivery) can justify the lower price. Clearly, this second condition is important for the accountant, as a lower price offered to one customer must be justified by identifiable cost savings. Additionally, the amount of the discount must be at least equaled by the amount of cost saved.

What about quantity discounts—are they permissible under Robinson-Patman? Consider the quantity discounts offered by **Morton Salt** during the 1940s. Morton offered substantial discounts to purchasers of a carload or more of product. The Supreme Court, in a 1948 decision, found that Morton Salt had violated the Robinson-Patman Act because so few buyers qualified for the quantity discount; at the time, only five large chain stores had purchases high enough to qualify for the lowest price. While the discounts were available to all purchasers, the Court noted that for all practical purposes, small wholesalers and retail grocers could not qualify for the discounts. A key point here is that so few purchasers were eligible for the discount that competition was lessened. So while the act states that quantity discounts can be given, they must not appreciably lessen competition.

Freight is considered part of price for purposes of the Robinson-Patman Act. If a company requires the customer to pay freight charges, then there is no problem. However, price discrimination may occur if the price charged includes delivery. Suppose the firm charges a uniform delivery price. Then, customers located next to the firm pay the same price as customers located 1,000 miles away. Because the cost of delivering to nearby customers is much less than delivering to distant customers, the nearby customers are paying "phantom freight."

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4. Chris Adams, "Steelmakers Complain About Foreign Steel; They Also Import It," *The Wall Street Journal* (March 22, 1999): A1 and A8.

5. This section relies on two sources. William A. Rutter, *Anti-Trust*, 3rd ed. (Gardena, CA: Gilbert Law Summaries, 1972): 57–64; and William A. Baldwin, *Market Power, Competition, and Antitrust Policy* (Homewood, IL: Richard D. Irwin, Inc., 1987): 430–435.

The burden of proof for firms accused of violating the Robinson-Patman Act is on the firms. The cost justification argument must be buttressed by substantial cost data. Proving a cost justification is an absolute defense; however, the expense of preparing evidence and the FTC's restrictive interpretations of the defense have made it a seldom used choice in the past. Now, the availability of large databases, the development of activity-based costing, and powerful computing make it a more palatable alternative. Still, problems remain. Cost allocations make such determinations particularly thorny. In justifying quantity discounts to larger companies, a company might keep track of sales calls, differences in time and labor required to make small and large deliveries, and so on.

In computing a cost differential, the company must create classes of customers based on the average costs of selling to those customers and then charge all customers in each group a cost-justifiable price.

Let's look at Cobalt, Inc., which manufactures vitamin supplements. The manufacturing costs average $163 per case (a case contains 100 bottles of vitamins). Cobalt, Inc., sold 250,000 cases last year to the following three classes of customer:

Customer	*Price per Case*	*Cases Sold*
Large drug store chain	$200	125,000
Small local pharmacies	232	100,000
Individual health clubs	250	25,000

Clearly, there is price discrimination, but is it justifiable? To answer that question, we need more information about the customer classes.

The large drug store chain requires Cobalt to put the chain's label on each bottle. This special labeling costs about $0.03 per bottle. The chain orders through electronic data interchange (EDI), which costs Cobalt about $50,000 annually in operating expenses and depreciation. Cobalt pays all shipping costs, which amounted to $1.5 million last year.

The small local pharmacies order in smaller lots, which requires special picking and packing in the Cobalt factory. This special handling adds $20 to the cost of each case sold. Sales commissions to the independent jobbers who sell Cobalt products to the pharmacies average 10 percent of sales. Bad debts expense is not high and amounts to 1 percent of sales.

Individual health clubs purchase vitamins in lots even smaller than those of the local pharmacies. The special picking and packaging costs average $30 per case. There are no sales commissions for the health clubs. Instead, Cobalt advertises in health club management magazines and accepts orders by phone. In addition, Cobalt has created point-of-sale posters and displays for the clubs. These marketing costs amount to $100,000 per year. Bad debts expense is a serious problem with the health clubs, as they frequently go out of business or change ownership. Bad debts expense for this class of customer averages 10 percent.

Now, it is possible to analyze the cost of each customer class. Exhibit 19-2, on the following page, shows the costs associated with each customer class. It is easy to see that there are significant cost differences in serving the three classes. Cobalt realizes 10.8 percent profit on the cost of sales to the chain store [($200 − $178.40)/$200]. The pharmacies provide about 10.1 percent profit [($232 − $208.52)/$232]. The health club related profit percentage is 11.2 percent [($250 − $222)/$250]. Even though the highest price ($250) is 25 percent above the lowest price ($200), profits vary within a narrow 1 percent range. The cost differences among the three classes of customer appear to explain the price differences.

Ethics

Just as a company can practice unethical behavior in applying costs, it can mislead in pricing. A good example is the practice of some airlines of providing "automatic upgrades."

EXHIBIT 19-2 Analysis of Cobalt, Inc., Customer Class Costs

Chain store:	
Manufacturing cost per case	$163.00
Special labeling cost ($0.03 × 100)	3.00
EDI ($50,000/125,000 cases)	0.40
Shipping ($1,500,000/125,000 cases)	12.00
Total cost per case	$178.40
Small pharmacies:	
Manufacturing cost per case	$163.00
Special handling per case	20.00
Sales commission ($232 × 0.10)	23.20
Bad debts expense ($232 × 0.01)	2.32
Total cost per case	$208.52
Health clubs:	
Manufacturing cost per case	$163.00
Special handling per case	30.00
Selling expense ($100,000/25,000 cases)	4.00
Bad debts expense ($250 × 0.10)	25.00
Total cost per case	$222.00

For example, from San Francisco to Washington, **Continental Airlines** had two unrestricted, 1-way coach prices—$409 and $703. The higher price resulted in an automatic upgrade to first class, while the receipt showed "coach fare." Why would the customer want such a ticket? Easy, because the customer's company reimburses only coach fares.[6]

Measuring Profit

OBJECTIVE 4

Explain why firms measure profit and calculate measures of profit using absorption and variable costing.

Profit is a measure of the difference between what a firm puts into making and selling a product or service and what it receives. It is the degree to which the firm becomes wealthier on account of engaging in transactions. The desire of firms to measure the increase in wealth has led to numerous definitions of profit. Some are used for external reporting and some for internal reporting.

Reasons for Measuring Profit

Clearly, firms are interested in measuring profit. In fact, firms are classified according to whether or not profit is the primary objective—they are either for-profit or not-for-profit entities. Profits are measured for a number of reasons. These include determining the viability of the firm, measuring managerial performance, determining whether or not a firm adheres to government regulations, and signaling the market about the opportunities for others to earn a profit.

Owners of a company want to know if the company is viable in both the short term and the long term. Work gives meaning to life. Staying in business is not only a means

6. Scott McCartney, "Why Ticket Says Coach but Seat Is Up Front," *The Wall Street Journal* (September 29, 1995): B1.

to an end but an end in itself. *The Money Game*, by Adam Smith,[7] contains an interesting passage in which he puzzles through John Maynard Keynes's reference to the stock market as a game. Smith writes:

> *Game? Game? Why did the Master say game? He could have said business, or profession, or occupation or what have you. What is a game? It is "sport, play, frolic or fun;" "a scheme or art employed in the pursuit of an object or purpose;" "a contest, conducted according to set rules, for amusement, recreation, or winning a stake." Does that sound like Owning a Share of American Industry? Participating in the Long-Term Growth of the American Economy? No, but it sounds like the stock market.*

That not only sounds like the stock market, it also sounds like many businesses. Steve Jobs started **Apple Computer** in a garage. Years later, a multimillionaire, he was eased out of Apple management—and immediately started **Next**. Later, he returned to Apple and is heavily involved in **Pixar**. Sam Walton stayed involved with **Wal-Mart** until his death, as did John D. Rockefeller with **Standard Oil**. Playing the game is important, and profit is a way of keeping score. Players must maintain positive profits to stay in the game. Enough losses and you're out.

Profit can be used to measure managerial performance. In this sense, profit indicates efficiency in the use of resources, because the costs are kept below the benefits. Assessing performance is complicated, but profit, because it is measured in dollars, simplifies scorekeeping. Top management is usually evaluated on the basis of profit and/or return on investment. Both measures require benefits to exceed costs.

Regulated firms must keep profits within certain limits. The profitability of a regulated monopoly is monitored to ensure that the public is served by this structure and that prices do not escalate to the level of an unregulated monopoly. Note that price alone is not set—instead, the price must be set to ensure a "reasonable rate of return," and it is tied to the costs incurred by the regulated firm. Examples of companies subject to regulation are utilities, local telephone companies, and cable television companies. These companies enjoy monopoly status, and they pay for the privilege through adherence to regulations.

Profit is also of interest to those outside a company because it is a signal of the opportunities available. A highly profitable firm signals the market that others might also benefit from entry. Low profits do not entice competition. For this reason, companies may deliberately avoid high short-term profits. For example, in the 1940s, **DuPont** marketed nylon to manufacturers of women's hosiery and lingerie at a price that was only 60 percent of what could have been charged—despite the fact that nylon was patented and there was virtually no competition. As a result, competition was delayed for five to six years, and the overall market for nylon expanded dramatically into unanticipated areas, such as its use in automobile tires.[8]

It should also be noted that even though a not-for-profit entity has no profit, it still is engaged in an exchange relationship and must assess its performance and long-term viability. While data on charities expands (some watchdog groups, such as the **National Charities Information Bureau** in New York, even have Internet Web sites and will take complaints online), the usability of the data leaves something to be desired. Corporate donors, in particular, want better measures of how well a charity fulfills its mission. The reason, of course, is that not-for-profit entities use and must account for resources. Supplies, postage, telephones, and office space all require money.

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7. Actually, Adam Smith is a pseudonym for George J. W. Goodman. But you can probably find *The Money Game* (New York: Vintage Books, 1976) under Adam Smith. The book is a very readable exploration of investing and investors. The passage cited here can be found on page 16.
8. Drucker, *op. cit.*

Employees do not necessarily make less than a market wage. They simply have no claim to any residual. As a result, many of the concepts covered in this chapter have relevance to not-for-profit entities. The **Girl Scouts of America**, for example, expect to profit from cookie sales, although they may not refer to the money made above cost as profit. Not-for-profit firms are still interested in the relationship between revenues and expenses, or inflows and outflows.

Absorption-Costing Approach to Measuring Profit

Absorption costing, or full costing, is required for external financial reporting. According to GAAP, profit is a long-run concept and depends on the difference between revenues and expenses. Over the long run, of course, all costs are variable. Therefore, fixed costs are treated as if they were variable by assigning some to each unit of production. **Absorption costing** assigns all manufacturing costs, direct materials, direct labor, variable overhead, and a share of fixed overhead to each unit of product. In this way, each unit of product absorbs some of the fixed manufacturing overhead in addition to the variable costs incurred to manufacture it. When a unit of product is finished, it takes these costs into inventory with it. When it is sold, these manufacturing costs are shown on the income statement as cost of goods sold. It is absorption costing that is used to calculate three measures of profit: gross profit, operating income, and net income.

Preparing the Absorption-Costing Income Statement

Lasersave, Inc., a company that recycles used toner cartridges for laser printers, began operations in August and manufactured 1,000 cartridges during the month with the following costs:

Direct materials	$ 5,000
Direct labor	15,000
Variable overhead	3,000
Fixed overhead	20,000
Total manufacturing cost	$43,000

During August, 1,000 cartridges were sold at a price of $60. Variable marketing cost was $1.25 per unit, and fixed marketing and administrative expenses were $12,000. The unit product cost of each toner cartridge is $43 ($43,000/1,000 units). This amount includes direct materials ($5), direct labor ($15), variable overhead ($3), and fixed overhead ($20). Notice that the fixed overhead is treated as if it were variable. That is, the total amount is divided by production and applied to each unit. Thus, the cost of goods sold for August is $43,000 ($43 × 1,000 units sold). Exhibit 19-3 illustrates the absorption-costing income statement for Lasersave for the month of August.

EXHIBIT 19-3 Absorption-Costing Income Statement for Lasersave, Inc., for August

		Percent of Sales
Sales	$ 60,000	100.00%
Less: Cost of goods sold	43,000	71.67
Gross profit	$ 17,000	28.33%
Less: Variable marketing expenses	(1,250)	(2.08)
Fixed marketing and administrative expenses	(12,000)	(20.00)
Operating income	$ 3,750	6.25%

The income statement shown in Exhibit 19-3 is the familiar full costing income statement used for external reporting. Recall that the difference between revenue and cost of goods sold is gross profit (or gross margin). This is not equal to operating income, because the marketing and administrative expenses remain to be covered. At one time, gross profit was a fairly useful measure of profitability. Marketing and administrative expenses were relatively stable and could be adjusted fairly easily. In today's economic environment, that is less true. Government regulations affect businesses in sometimes unforeseen ways. Environmental cleanup and modification of facilities to comply with the Americans with Disabilities Act are just two examples of regulations that increase nonmanufacturing expenses. Additionally, research and development, also an expense subtracted from gross profit to yield operating income, is increasingly important. Now, gross profit is less useful and cannot be used as a sole measure of the long-run health of the firm.

Exhibit 19-3 also shows the "Percent of Sales" column which is often associated with the absorption-costing income statement. Notice that Lasersave, Inc., earned a gross profit of just over 28 percent of sales and that operating income was 6.25 percent of sales. Is this good or bad performance? It depends on the typical experience for the industry. If most firms in the industry earned a gross margin of 35 percent of sales, Lasersave would be considered below average, and it might look for opportunities to decrease cost of goods sold or to increase revenue.

What about absorption-costing operating income? Is it a reasonable measure of performance? Problems exist with this measure, too. First, managers can remove some current-period costs from the income statement by producing for inventory. Second, the absorption-costing format is not useful for decision making.

Disadvantages of Absorption Costing

In general, a company manufactures a product in order to sell it. In fact, that was the case for Lasersave for the month of August when every unit produced was sold. But what happens when the company produces for inventory? Suppose that in September, Lasersave produces 1,250 units but sells only 1,000. The price, variable cost per unit, and total fixed costs remain the same. Will September operating income equal August operating income? Exhibit 19-4 shows the income statement for September.

EXHIBIT 19-4 Absorption-Costing Income Statement for Lasersave, Inc., for September

Sales	$ 60,000
Less: Cost of goods sold*	39,000
Gross profit	$ 21,000
Less:	
Variable marketing expenses	(1,250)
Fixed marketing and administrative expenses	(12,000)
Operating income	$ 7,750

*Direct materials ($5 × 1,250)	$ 6,250
Direct labor ($15 × 1,250)	18,750
Variable overhead ($3 × 1,250)	3,750
Fixed overhead	20,000
Total manufacturing overhead	$48,750
Add: Beginning inventory	0
Less: Ending inventory	(9,750)
Cost of goods sold	$39,000

Operating income in September is $7,750 versus operating income for August of $3,750. The same number of units was sold, at the same price, and the same costs. What happened? The culprit is treating fixed manufacturing overhead as if it were variable. In August, 1,000 units were produced, and each one absorbed $20 ($20,000/1,000) of fixed overhead. In September, however, the same total fixed manufacturing overhead of $20,000 was spread out over 1,250 units, so each unit absorbed only $16 ($20,000/1,250). The 250 units that went into ending inventory took with them all of their variable costs of production of $5,750 ($23 × 250) plus $4,000 (250 × $16) of fixed manufacturing overhead from September. That $4,000 of inventoried fixed manufacturing overhead is precisely equal to the $4,000 difference in operating incomes.

Clearly, the absorption-costing income statement gives the wrong message in September. It seems to say that September performance was better than August performance, when the sales performance was identical and, arguably, production was off by 250 units. (Even if the company wanted to produce for inventory, it is misleading to increase income for the period as a result.)

Of course, the whole purpose of manipulating income by producing for inventory is to increase profit above what it would have been without the extra production. Managers who are evaluated on the basis of operating income know that they can temporarily improve profitability by increasing production. They may do this to ensure year-end bonuses or promotions. As a result, the usefulness of operating or net income as a measure of profitability is weakened. Companies that use absorption-costing income as a measure of profitability may institute rules regarding production. For example, a manufacturer of floor care products insists that the factory produce only the amounts called for in the master budget. While this will not erase the impact of changes in inventory on operating income, it does mean that the factory manager cannot deliberately manipulate production to increase income.

The second disadvantage of absorption costing is that it is not a useful format for decision making. Suppose that Lasersave was considering accepting a special order for 100 toner cartridges at $38. Should the company accept? If we focus on the absorption-costing income statement, who can tell? In August, the manufacturing cost per unit was $43. In September, it was $39. Neither figure included the marketing cost. The treatment of fixed overhead as a unit-level variable cost has made it difficult to see just what the incremental cost is.

Variable-Costing Approach to Measuring Profit

An approach to measuring profitability that avoids the problems inherent in making fixed overhead a variable cost is variable costing. **Variable costing** (sometimes called direct costing) assigns only unit-level variable manufacturing costs to the product; these costs include direct materials, direct labor, and variable overhead. Fixed overhead is treated as a period cost and is not inventoried with the other product costs. Instead, it is expensed in the period incurred.

The result of treating fixed manufacturing overhead as a period expense is to reduce the factory costs that are inventoriable. Under variable costing, only direct materials, direct labor, and variable overhead are inventoried. (Remember that marketing and administrative expenses are never inventoried—whether variable or fixed.) Therefore, the inventoriable variable product cost for Lasersave is $23 ($5 direct materials + $15 direct labor + $3 variable overhead).

The variable-costing income statement is set up a little differently from the absorption-costing income statement. Exhibit 19-5 gives Lasersave's variable-costing income statements for August and September. Notice that all unit-level variable costs (including variable manufacturing and variable marketing expenses) are summed and subtracted from sales to yield contribution margin. Then, all fixed expenses for the period, whether they are incurred by the factory or by marketing and administration, are subtracted to yield operating income.

EXHIBIT 19-5 Variable-Costing Income Statements for Lasersave, Inc.

	For the Month of August	For the Month of September
Sales	$ 60,000	$ 60,000
Less: Variable expenses*	24,250	24,250
Contribution margin	$ 35,750	$ 35,750
Less:		
Fixed manufacturing overhead	(20,000)	(20,000)
Fixed marketing and administrative expenses	(12,000)	(12,000)
Operating income	$ 3,750	$ 3,750

*Direct materials	$ 5,000
Direct labor	15,000
Variable overhead	3,000
Total variable manufacturing expenses	$23,000
Add: Variable marketing expenses	1,250
Total variable expenses	$24,250

Notice that the August and September income statements for Lasersave are identical. This seems right. Each month had identical sales and costs. While September production was higher, that will show up as an increase in inventory on the balance sheet. As we can see, variable-costing operating income cannot be manipulated through overproduction, since fixed manufacturing overhead is not carried into inventory.

Let's take a closer look at each month. In August, production exactly equaled sales. In this case, none of the period's costs go into inventory, and absorption-costing operating income is equal to variable-costing income. In September, inventory increased, and absorption-costing operating income is higher than variable-costing operating income. The difference, $4,000 ($7,750 − $3,750), is just equal to the fixed overhead per unit multiplied by the increase in inventory ($16 × 250 units).

What happens when inventory decreases? Again, there is an effect on operating income under absorption costing but not under variable costing. Let's take Lasersave into the month of October, when production is 1,250 units (just like September), but 1,300 units are sold. Exhibit 19-6, on the following page, gives the comparative income statements for both absorption and variable costing.

In this case, when inventory decreases (or production is less than sales), variable-costing operating income is greater than absorption-costing operating income. The difference of $800 ($14,475 − $13,675) is equal to the 50 units that, under absorption costing, came from inventory with $16 of the previous month's fixed manufacturing overhead attached. Exhibit 19-7, on the following page, summarizes the impact of changes in inventory on operating income under absorption costing and variable costing.

To summarize, when inventories change from the beginning to the end of the period, the two costing approaches will give different operating incomes. The reason for this is that absorption costing assigns fixed manufacturing overhead to units produced. If those units are sold, the fixed overhead appears on the income statement under cost of goods sold. If the units are not sold, the fixed overhead goes into inventory. Under variable costing, however, all fixed overhead for the period is expensed. As a result, absorption costing allows managers to manipulate operating income by producing for inventory.

EXHIBIT 19-6 Comparative Income Statements for Lasersave, Inc., for the Month of October

	Absorption Costing		Variable Costing
Sales	$ 78,000	Sales	$ 78,000
Less: Cost of goods sold*	50,700	Less: Variable expenses	31,525
Gross profit	$ 27,300	Contribution margin	$ 46,475
Less:		Less:	
Variable marketing expenses	(1,625)	Fixed manufacturing overhead	(20,000)
Fixed marketing and administrative expenses	(12,000)	Fixed marketing and administrative expenses	(12,000)
Operating income	$ 13,675	Operating income	$ 14,475

*1,300 × $39 = $50,700.

EXHIBIT 19-7 Changes in Inventory under Absorption and Variable Costing

If	Then
1. Production > Sales	Absorption-costing income > Variable-costing income
2. Production < Sales	Absorption-costing income < Variable-costing income
3. Production = Sales	Absorption-costing income = Variable-costing income

The variable-costing income statement has an advantage in addition to providing better signals regarding performance. It also provides more useful information for management decision making. Look again at Exhibit 19-6. How much additional profit can be made on the sale of one more toner cartridge? The absorption-costing income statement indicates that $21 ($27,300/1,300) is the per-unit gross profit. However, that figure includes some fixed overhead, and fixed overhead will not change if another unit is produced and sold. The variable-costing income statement gives more useful information. Additional contribution margin of the extra unit is $35.75 ($46,475/1,300). The key insight of variable costing is that fixed expenses do not change as units produced and sold change. Therefore, while the variable-costing income statement cannot be used for external reporting, it is a valuable tool for some management decisions.

The measures of profit discussed in this section all applied to the company. Additional factors must be considered in using any income statement for internal reporting and performance evaluation. Neither operating income nor net income (operating income less income taxes) are completely sufficient for profitability analysis. In other words, the questions that firms most want answered cannot be answered with an analysis of net income alone. One reason for the insufficiency of net income is aggregation of data. Aggregation refers to the summing of components of profit into more general categories. The fine detail necessary to determine the existence of problems and to take corrective action is missing from the income statement. For example, the income statement may indicate low revenue, but it does not indicate why it is low. Is quantity sold down? Has price decreased? Are some products experiencing increased sales while others have experienced decreased sales? More analysis is needed to answer these questions and others.

OBJECTIVE 5

Determine the profitability of segments.

Profitability of Segments

Companies frequently want to know the profitability of a segment of the business. That segment could be a product, division, sales territory, or customer group. Determining the profit attributable to subdivisions of the company is harder than determining overall profit because of the need to allocate expenses. Accurate tracing of costs to each segment is difficult. Still, the importance of segmental profit to management decision making can make the exercise worthwhile.

Profit by Product Line

It is easy to understand why a firm would like to know whether or not a particular product is profitable. A product that consistently loses money and has no potential to become profitable could be dropped. This would free up resources for a product with higher potential. On the other hand, a profitable product may merit additional time and attention.

Movie studios now use sophisticated software to predict the popularity of films based on the popularity of similar films in particular neighborhoods. For example, Fox can target a teen flick like "Drive Me Crazy" to screens located near suburban malls, rather than blanketing movie theaters across the country. The more limited release saves $3,000 in film-duplication cost per copy, allowing the movie to post a reasonable profit.[9]

Product-line profitability would be easy to compute if all costs and revenues were easily traceable to each product. This is seldom the case. Therefore, companies must first determine how profit will be computed. Three possibilities (in order of increasing accuracy) are absorption costing, variable costing, and activity-based costing. Each allocates cost to a product line in a different way and will give a different result. The company's need for accuracy determines which is used.

Let's examine Alden Company, which manufactures two products: basic fax machines and multi-function fax machines. The basic fax machine has telephone and fax capability. This type of machine is less expensive and easier to produce. The multi-function fax machine is the high-end machine. It is a combination of 2-line telephone, fax, computer printer, and copier. The multi-function fax machine uses more advanced technology and is more difficult to produce. Data on each product follow:

	Basic	*Multi-Function*
Number of units	20,000	10,000
Direct labor hours	40,000	15,000
Price	$200	$350
Prime cost per unit	$55	$95
Overhead per unit*	$30	$22.50

*Annual overhead is $825,000, and overhead is applied on the basis of direct labor hours.

Marketing expenses, all variable, amount to 10 percent of sales. Administrative expenses of $2 million, all fixed, are allocated to the products in accordance with revenue. Absorption-costing income by product line is shown in Exhibit 19-8 on the following page.

Clearly, the multi-function fax machine is more profitable. But what does this tell us? Can we conclude that each basic fax machine sold adds $41.65 ($833,000/20,000 units) to profit? Does each multi-function fax machine sold add $104.20 ($1,042,000/10,000) to profit? No, Alden Company has intermingled variable and fixed costs and has allocated administrative expenses on the basis of revenue, when there is no reason to believe that

9. Ronald Grover, "Fox's New Star: The Internet," *Business Week E. Biz* (November 1, 1999): 42–46.

EXHIBIT 19-8

Alden Company
Absorption-Costing Income Statement
(In thousands of dollars)

	Basic	*Multi-Function*	*Total*
Sales	$ 4,000	$3,500	$ 7,500
Less: Cost of goods sold	1,700	1,175	2,875
Gross profit	$ 2,300	$2,325	$ 4,625
Less:			
Marketing expenses	(400)	(350)	(750)
Administrative expenses	(1,067)	(933)	(2,000)
Operating income	$ 833	$1,042	$ 1,875

revenue drives administrative expenses. Additionally, overhead has been assigned to the products on a per-unit basis, but we do not know just what it includes. Is $22.50 an accurate representation of the overhead resources required to produce one multi-function fax machine? If not, a different costing system might be used.

Using Variable Costing to Measure Segment Profit

Alden Company could use variable costing and segregate direct fixed and common fixed expenses as well. To apply variable costing to Alden Company, we need additional information on fixed and variable costs of overhead.

	Variable	*Fixed*
Overhead:		
Setups		$ 40,000
Maintenance		120,000
Supplies	$ 80,000	
Power	280,000	
Machine depreciation		250,000
Other factory costs		55,000
Total	$360,000	$465,000

Recall that overhead is applied on the basis of direct labor hours. Therefore, the variable overhead assigned to basic fax machines is $261,818 [$360,000 × (40,000/55,000)]. The variable overhead assigned to multi-function fax machines is $98,182 [$360,000 × (15,000/55,000)]. Now, we can prepare a segmented income statement as shown in Exhibit 19-9.

While absorption-based operating income equals variable-costing operating income in this case (because all units produced were sold), the variable-costing income statement provides more useful information. Now, we can see how much more profit is made if another fax machine is sold. An additional basic fax machine adds $111.90 ($2,238,000/20,000) to profit. An additional multi-function fax machine adds $210.20 ($2,102,000/10,000) to profit. The key insight of variable costing is that fixed expenses do not change as units produced and sold change. Therefore, while the variable-costing income statement cannot be used for external reporting, it is a valuable tool for some management decisions. One problem remains with the variable-costing approach. The fixed costs were not assigned to either product. Is this appropriate? If all fixed costs

EXHIBIT 19-9

Alden Company
Variable-Costing Income Statement
(In thousands of dollars)

	Basic	*Multi-Function*	*Total*
Sales	$ 4,000	$ 3,500	$ 7,500
Less:			
Variable cost of goods sold	(1,362)	(1,048)	(2,410)
Sales commissions	(400)	(350)	(750)
Contribution margin	$ 2,238	$ 2,102	$ 4,340
Less:			
Fixed overhead			(465)
Administrative expenses			(2,000)
Operating income			$ 1,875

must be incurred despite which products are produced, the answer is yes. However, often a cost is fixed with respect to units produced but is variable according to another activity driver. In this case, activity-based costing yields more accurate cost information.

Using Activity-Based Costing to Measure Segment Profit

An activity-based costing approach, with its insight into unit-level, batch-level, product-level, and facility-level costs, may give management a more accurate feel for profits attributable to different product lines. Let's revisit Alden Company and look for additional information on the drivers for each overhead cost. Exhibit 19-10 contains

EXHIBIT 19-10 Overhead Activities and Drivers

Overhead Cost Category	Cost Driver	Total Cost
Setups	Number of setups	$ 40,000
Maintenance	Maintenance hours	120,000
Supplies	Direct labor hours	80,000
Power	Machine hours	280,000
Machine depreciation	Machine hours	250,000
Other factory costs	(None)	55,000
		$825,000

	Usage of Cost Drivers by Product	
	Basic	**Multi-Function**
Number of setups	10	30
Maintenance hours	2,000	8,000
Direct labor hours	40,000	15,000
Machine hours	10,000	90,000

this information along with cost driver usage by product. Note that there is no activity driver for other factory costs, since these are facility-level costs and will remain no matter which product is manufactured.

Now, we can recast the product-line income statement using the activity-based costing information. This is done in Exhibit 19-11. The value of the activity-based costing income statement is that it reminds management that costs cannot be simply separated into fixed and variable components on the basis of units alone. Alden Company can see that the multi-function fax machines add overhead cost in the form of more setups and more usage of power and machinery. Importantly, management can now concentrate on reducing the use of drivers that directly add cost. Previously, overhead was applied on the basis of direct labor hours. This misleads management into thinking that the reduction of direct labor hours will result in decreased overhead. However, an activity-based approach shows the complexity of the manufacturing operation and reminds managers that a decrease in power costs can only be achieved with a decrease in machine usage (perhaps by the use of more efficient machinery). Similarly, a decrease in setup cost can only come about through the streamlining or elimination of setup activity. Reducing activities reduces actual costs and leads to increased profits.

EXHIBIT 19-11

Alden Company
Activity-Based Costing Income Statement
(In thousands of dollars)

	Basic	*Multi-Function*	*Total*
Sales	$ 4,000	$3,500	$ 7,500
Less:			
Prime costs	(1,100)	(950)	(2,050)
Setups	(10)	(30)	(40)
Maintenance	(24)	(96)	(120)
Supplies	(58)	(22)	(80)
Power	(28)	(252)	(280)
Machine depreciation	(25)	(225)	(250)
Sales commissions	(400)	(350)	(750)
Contribution margin	$ 2,355	$1,575	$ 3,930
Less:			
Other fixed overhead			(55)
Administrative expenses			(2,000)
Operating income			$ 1,875

It should be pointed out that a pure activity-based costing approach is not acceptable for external financial reporting. This is because firms using a pure ABC system would treat facility-level costs as period expenses. They are certainly not attached to units produced. However, GAAP require that units produced absorb some of this overhead. As a result, ABC is used internally for management decision making.

Once management believes the cost data are adequate and the initial profit computation is completed, they will want to ask further questions. These might relate to what the managers will do with the profitability information. A very high profit might signal that the multi-function fax machine is overpriced—leaving the door open for competi-

tors. A low or even negative product profit may signal the need to start looking for a replacement—one with higher potential. Declining profit, coupled with the knowledge that customers dislike curled faxes, may lead management to discontinue the basic fax machine even with the positive profit it shows. This would free up resources for production of the next generation of fax machines. Alternatively, a low-profit product may be kept if customers appreciate dealing with a company that offers a full line of products. Management requires data on profitability to aid in sales mix decisions.

Divisional Profit

Just as companies want to know the relative profitability of different products, they may want to assess the relative profitability of different divisions of the company. Divisional profit is often used in evaluating the performance of managers. Failure to earn a profit can lead to the division's closing. For example, **General Motors** decided to drop the Oldsmobile line due to its continued unprofitability.

Divisional profit may be calculated using any of three approaches described in the preceding section. Usually, the absorption-based approach is used, and a share of corporate expense is allocated to each division to remind them that all expenses of the company must be covered. Suppose that Polyglyph, Inc., is a conglomerate with four divisions: Alpha, Beta, Gamma, and Delta. Corporate expenses of $10 million are allocated to each division on the basis of sales. The divisional income statements are as follows:

	Alpha	*Beta*	*Gamma*	*Delta*	*Total*
Sales	$ 90	$ 60	$ 30	$120	$300
Cost of goods sold	35	20	11	98	164
Gross profit	$ 55	$ 40	$ 19	$ 22	$136
Division expenses	(20)	(10)	(15)	(20)	(65)
Corporate expenses	(3)	(2)	(1)	(4)	(10)
Operating income (loss)	$ 32	$ 28	$ 3	$ (2)	$ 61

How might Polyglyph view these results? Clearly, Delta has an operating loss. Corporate would raise questions about Delta's continuing viability. If Delta has good potential for an improved profit picture, for example, it might be afforded additional time to turn a profit. Delta's divisional expenses are relatively high. Perhaps this is due to an ambitious research and development program. If payoffs from this program can be anticipated, corporate management will be much less concerned than if the divisional expenses do not have potential. Corporate management will also be concerned with trends over time and the immediate and long-term prospects for each division. Even a seemingly profitable division, like Alpha, may need attention if it is in a declining industry or if it uses significantly more resources than indicated by the corporate expense allocation. Additional material on divisional profitability and responsibility accounting is covered in Chapter 10.

Customer Profitability

While customers are clearly important to profit, some are more profitable than others. Companies that assess the profitability of various customer groups can more accurately target their markets and increase profits. The first step in determining customer profitability is to identify the customer. The second step is to determine which customers add value to the company.

The identification of a company's customer may seem obvious. Grocery stores and automobile repair shops can easily identify their customers, and they may even know them by name. However, sometimes the company is part of a complex chain of customer relationships. For example, **Aetna, Inc.**, is the largest U.S. health insurer. Its

customer base includes companies that buy health insurance, the employees who use it, and the doctors and hospitals that provide health services. Each group is a customer group with particular needs. If one group is unserved and goes elsewhere, the other groups are affected.[10]

Originating and Keeping Customers

Once customer groups have been identified, the second step is to determine which customer groups are the most profitable, work to keep the existing customers in those groups, and add more of them. Sometimes, the company may need to add an initially unprofitable customer group and increase efficiency to make the group profitable.

It is generally more costly to win a customer than to keep a customer. Originating a customer may require advertising, sales calls, the drafting of proposals, and the generation of prospective customers lists. All of these activities are costly. Keeping existing customers happy also requires effort. For example, many stores provide free gift wrapping—a service to the customer who has already made a purchase. Firms must have profitability data to understand the profit contribution of customer relationships and to match the costs of increased service with the benefits. Many companies are now taking a customer life-cycle approach by recognizing that a loyal customer will yield significant revenue over the years. For example, the lifetime revenue stream of a pizza eater can be $8,000. For more expensive products, like a Cadillac, the amount approaches $332,000.[11]

Finally, some customers are so unprofitable that they should not be kept. **Rice Lake Products, Inc.**, manufactures movable owl and geese decoys. The company sold to both specialty stores and to **Wal-Mart**. However, the Wal-Mart sales, at $19 each, infuriated the specialty stores that charged $20. Even worse from Rice Lake Products' point of view was the fact that the profit on a Wal-Mart sale averaged just $0.50 while the profit on a specialty store sale amounted to $4. The reason for the difference was that Wal-Mart required special packaging and promotion and returned product that did not sell. The company chose to concentrate on sales to specialty stores.[12]

Example of Customer Profitability Analysis in a Service Company

BZW Securities, the investment arm of **Barclays Bank** in the United Kingdom, developed an ABC model of service profitability.[13] BZW executes trades for clients and also trades on its own account. Thus, it has two sources of profit: net commissions on customer trades and gains (or losses) on its own trades. Like many securities firms, BZW had difficulty tracing revenues and costs to particular trades. As a result, managers could not determine whether certain customers were profitable. For example, customers of BZW can call brokers at the firm to obtain market research, trading advice, trading services, and so on. The cost to BZW of providing each service differs. However, clients are not charged on the basis of which services they use, or even how much of the service they use. Clients are charged only commissions on stocks bought and sold. In general, a commission of 0.2 percent is charged on the price of each trade, so if a customer buys £50,000 of stock, the commission is £100 (£50,000 × 0.002). It is easy to see that a customer who requires significant market advice yet trades only £10,000 may be less profitable than a customer who requires the same amount of market advice but trades £100,000. To remedy this problem, BZW created an activity-based model to track revenues and costs to each trading transaction.

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10. Barbara Martinez, "In Bid to Help Bottom Line, Aetna Tries to Improve Bedside Manner," *The Wall Street Journal* (February 23, 2001): 1.
11. James L. Heskett, Thomas O. Jones, Gary W. Loveman, W. Earl Sasser, Jr., and Leonard A. Schlesinger, "Putting the Service-Profit Chain to Work," *Harvard Business Review* (March/April 1994): 164–174.
12. Christie Brown, "A Great Way to Retire," *Forbes* (October 9, 1995): 96–97.
13. Information in this section was taken from Nicolas Stuchfield and Bruce W. Weber, "Modeling the Profitability of Customer Relationships: Development and Impact of Barclays de Zoete Wedd's BEATRICE," *Journal of Management Information Systems*, 9, No. 2 (Fall 1992): 53–76.

COST MANAGEMENT **Technology in Action**

When **Fleet Financial Group** merged with **BankBoston**, it found that it needed more sophisticated measures of customer profitability. Previously, Fleet used a software package called Integrated Profit Management System (IPMS) to determine product and organizational profitability. Developed by **PMG Systems, Inc.**, IPMS allowed the company to "capture costs related to different types of transactions, such as teller salaries, courier fees, operational processes, and technology . . . let[ting] managers compare expenses related to customers making branch deposits versus those of customers making mail or automated teller machine deposits."

Fleet's new system, also provided by PMG Systems, Inc., is the Customer Profitability Management System (CPMS). IPMS measures the profitability of business processes and products, whereas CPMS measures the profitability of the bank's 20 million customers. For example, the software has indicated that customers who use branches cost more than those using ATMs or the telephone.

CPMS was introduced in 1997 in the **Canadian Imperial Bank of Commerce**. According to the bank's vice president of customer marketing, Rick Miller, Canadian Imperial has found that CPMS "fundamentally changed our business processes." Previously, "Canadian Imperial segmented customers by the amount of funds they held. Now the bank also analyzes the actual transactions customers conduct, by channel, to calculate the cost of serving each one." The bank has found significant differences in the profitability of customers holding the same amount of assets. This information has been used to conduct more precisely targeted marketing campaigns and to develop strategies based on customers' profit potential. Customers with current high profitability can be identified and given personal attention. Low-profit customers with low potential for future profit are encouraged to use less costly channels such as the ATM or telephone.

Source: Adriana Senior, "Fleet Picks PMG Software to Track Customer Costs," *American Banker* (August 3, 1999, Vol. 164, i147): 13.

After all the data on customer trades, costs, and revenues were collected, BZW segmented customers into four classes. The first class consists of customers with adequate profit levels and the potential for increased trading volume. Customers in this class are targeted for additional contact by BZW's senior people. The second class is composed of customers who are profitable at their current mix of services but unlikely to respond to attempts to upgrade. The current mix of services is maintained for these clients. The third class of customers includes those customers whose revenues do not fully cover costs but whose marginal revenue does contribute to fixed overhead and who do have the potential for upgrade. Discussions with these clients may lead to upgraded volume or to a reduction in the services least valued by the clients. In other words, BZW attempts to increase the profitability of this class through frank discussion and decision making. For example, less profitable clients are encouraged to use electronic order entry, an alternative that requires less telephone time with BZW's staff. A further alternative for BZW is to change the mix of services provided to a client by altering the seniority of its staff.

The fourth class is definitely unprofitable and has little potential to improve. BZW has a number of alternatives regarding unprofitable customers. It can try to increase trading volume with that customer, offer fewer services, or increase the commission charged.

Prior to the development of the activity-based costing model, BZW could calculate only the total revenue (commissions) associated with each customer. Individual customer profitability was impossible to calculate, since costs could not be traced to each customer. BZW's management could not assess the effectiveness of its expenditures and service efforts. Now, it can assess not only the profitability of each client but also the reasons why.

Overall Profit

The computation of segmental profit is clearly useful in many management decisions. However, the allocation problems inherent in computing profit on divisions, segments, and product lines may mean that overall profit is most useful in some contexts. It is certainly easiest to compute, and it does have meaning. If the overall profit is consistently

positive, the company remains in business, even if one or more segments is losing money. For example, High Flight is a company that engages in three services: flight training, short-haul flight services (basically a courier service for regional banks), and airplane leasing. High Flight had real difficulty determining the profitability of each service. The same planes were used for each, so the allocation of airplane depreciation to the three services would seem reasonable. But the owner of High Flight realized that such an allocation would divert attention from the underlying question: Should all three services be offered? Some costs were easily traceable to each segment, e.g., fuel costs and pilot services. Other costs were difficult to allocate; plane depreciation and hangar rent are examples. Ultimately, High Flight performed a modified profitability analysis of each service and determined that flight training was probably a money loser. What did management decide? They kept all three because they realized that pilots preferred to rent planes from the place where they received flight training. Thus, the linkage between flight training and airplane rental meant that the company had to retain both or neither.

Analysis of Profit-Related Variances

OBJECTIVE 6

Compute the sales price, price volume, contribution margin, contribution margin volume, sales mix, market share, and market size variances.

Managers frequently want to compare actual profit earned with expected profit. This leads naturally to variance analysis, in which actual and budgeted amounts are compared. Profit variances center on the difference between budgeted and actual prices, volumes, and contribution margin.

Sales Price and Price Volume Variances

Actual revenue may differ from expected revenue because actual price differs from expected price or because quantity sold differs from expected quantity sold, or both. The **sales price variance** is the difference between actual price and expected price multiplied by the actual quantity or volume sold. In equation form, it is the following:

$$\text{Sales price variance} = (\text{Actual price} - \text{Expected price}) \times \text{Quantity sold}$$

The **price volume variance** is the difference between actual volume sold and expected volume sold multiplied by the expected price. It can be expressed in the following equation:

$$\text{Price volume variance} = (\text{Actual volume} - \text{Expected volume}) \times \text{Expected price}$$

As is the case with all variances, the sales price and price volume variances are labeled favorable if the variance increases profit above the amount expected. They are labeled unfavorable if the variance decreases profit below the amount expected.

Suppose that Armour Company distributes produce. In May, Armour Company expects to sell 20,000 pounds of produce at an average price of $0.20 per pound. Actual results are 23,000 pounds sold at an average price of $0.19 per pound. The sales price variance is $230 unfavorable [($0.20 − $0.19) × 23,000]. Note that the sales price variance is unfavorable because the actual price of $0.19 per pound is less than the expected price of $0.20. The price volume variance is $600 favorable [(23,000 − 20,000) × $0.20]. The price volume variance is favorable because a higher quantity was sold than expected, acting to raise revenue.

The sum of the sales price and price volume variances is the **total (overall) sales variance**. Of course, this is simply the difference between actual and expected revenue. Breaking the overall sales variance into price and volume components gives managers a better feel for why actual revenue may differ from budgeted revenue.

It is important to note that these variances just begin to alert managers to problems in pricing and sales. As is the case with all variances, significant variances are investigated to discover the underlying reasons for the difference between expected and actual results. In the case of an unfavorable sales price variance, the reason may be the giving of unanticipated price discounts, perhaps to meet competitors' prices. The sales

price and price volume variances interact. For example, an unfavorable sales price variance may be paired with a favorable price volume variance because the lower price raised quantity sold.

Contribution Margin Variance

The **contribution margin variance** is simply the difference between actual and budgeted contribution margin.

> Contribution margin variance = Actual contribution margin − Budgeted contribution margin

This variance is favorable if the actual contribution margin earned is higher than the budgeted amount.

Consider Birdwell, Inc., which produces two types of bird feeders. The regular type is a simple plastic and wood model, which can be hung from a tree branch. The deluxe model is a larger, stand-alone model, which includes a post and a round squirrel shield to prevent squirrels from eating the bird seed. Budgeted and actual data for the two models are shown in Exhibit 19-12.

EXHIBIT 19-12 Data for Birdwell, Inc.

	Budgeted Amounts		
	Regular Model	Deluxe Model	Total
Sales:			
($10 × 1,500)	$15,000		
($50 × 500)		$25,000	$40,000
Variable expenses	9,000	17,500	26,500
Contribution margin	$ 6,000	$ 7,500	$13,500

	Actual Amounts		
	Regular Model	Deluxe Model	Total
Sales:			
($10 × 1,250)	$12,500		
($50 × 625)		$31,250	$43,750
Variable expenses	7,500	21,875	29,375
Contribution margin	$ 5,000	$ 9,375	$14,375

The contribution margin variance for Birdwell, Inc., is $875 favorable ($14,375 − $13,500). This variance can be broken down into a volume variance and a sales mix variance.

Contribution Margin Volume Variance

The **contribution margin volume variance** is the difference between the actual quantity sold and the budgeted quantity sold multiplied by the budgeted average unit contribution margin. Note the difference between the contribution margin volume variance and the price volume variance. Both look at the difference between actual and budgeted volume sold. However, the price volume variance multiplies that difference by sales price, while the contribution margin volume variance multiplies that difference by

contribution margin. Therefore, the contribution margin volume variance gives management information about gained or lost profit due to changes in the quantity of sales.

$$\text{Contribution margin volume variance} = (\text{Actual quantity sold} - \text{Budgeted quantity sold}) \times \text{Budgeted average unit contribution margin}$$

The budgeted average unit contribution margin is the total budgeted contribution margin divided by the budgeted total number of units of all products to be sold.

In the Birdwell example, the total volume budgeted is 2,000 units (1,500 regular and 500 deluxe). The actual units sold amounted to 1,875 (1,250 regular and 625 deluxe). The budgeted average unit contribution margin is $6.75 ($13,500/2,000). Therefore, the contribution margin volume variance is $843.75 unfavorable [(2,000 − 1,875) × $6.75].

The unfavorable contribution margin volume variance is clearly the result of selling fewer units, in total, than budgeted. Still, we can see that Birdwell, Inc., actually had a higher contribution margin than expected. The shift in the sales mix explains why.

Sales Mix Variance

The sales mix represents the proportion of total sales yielded by each product. A company which produces only one product obviously has a sales mix of 100 percent for that product. All units sold will be that product, and there is no effect of changing sales mix on profit. Multiproduct firms, however, do experience shifting in their sales mix. If relatively more of the high-profit product is sold, profit will be higher than expected. If the sales mix shifts toward the low-profit product, profit will be lower than expected. We can define the **sales mix variance** as the sum of the change in units for each product multiplied by the difference between the budgeted contribution margin and the budgeted average unit contribution margin.

$$\begin{aligned}\text{Sales mix variance} = {} & [(\text{P1 actual units} - \text{P1 budgeted units}) \times (\text{P1 budgeted unit contribution margin} - \text{Budgeted average unit contribution margin})] + \\ & [(\text{P2 actual units} - \text{P2 budgeted units}) \times (\text{P2 budgeted unit contribution margin} - \text{Budgeted average unit contribution margin})]\end{aligned}$$

The preceding sales mix variance equation is for two products. If three products were produced, we would simply keep adding the change in units times the change in contribution margin for every additional product.

Again consider Birdwell, Inc., data from Exhibit 19-12. The budgeted data show a sales mix of 1,500 regular models and 500 deluxe models. This reduces to a 3:1 sales ratio (1,500:500 is equivalent to 3:1). However, the actual data show that 1,250 regular and 625 deluxe models were sold. This is a ratio of 2:1.

The sales mix variance for Birdwell is computed as follows:

$$\begin{aligned}\text{Birdwell sales mix variance} = {} & [(1{,}250 - 1{,}500) \times (\$4.00 - \$6.75)] \\ & + [(625 - 500) \times (\$15.00 - \$6.75)] \\ = {} & \$1{,}718.75 \text{ Favorable}\end{aligned}$$

Now, we can see that the favorable sales mix variance of $1,718.75, combined with the unfavorable contribution margin volume variance of $843.75, explains the overall favorable contribution margin variance of $875.

Market Share and Market Size Variances

Managers not only want to look inward at contribution margin through the volume and sales mix variances, but they also want to look outward to see how their company is doing compared with the rest of their industry. **Market share** gives the proportion of industry sales accounted for by a company. **Market size** is the total revenue for the industry. Clearly, both market size and market share have an impact on a company's profits.

The **market share variance** is the difference between the actual market share percentage and the budgeted market share percentage multiplied by actual industry sales in units times budgeted average unit contribution margin. The **market size variance** is the difference between actual and budgeted industry sales in units multiplied by the budgeted market share percentage times the budgeted average unit contribution margin.

$$\text{Market share variance} = [(\text{Actual market share percentage} - \text{Budgeted market share percentage}) \times (\text{Actual industry sales in units})] \times (\text{Budgeted average unit contribution margin})$$

$$\text{Market size variance} = [(\text{Actual industry sales in units} - \text{Budgeted industry sales in units}) \times (\text{Budgeted market share percentage})] \times (\text{Budgeted average unit contribution margin})$$

Suppose that the budgeted unit sales for the bird feeder industry were 20,000 (of all model types), and actual unit sales for the industry were 23,000. Then, the Birdwell budgeted market share is 10 percent (2,000/20,000). Birdwell's actual market share is 8.152 percent (1,875/23,000). The market share variance for Birdwell is $2,869 unfavorable [(0.08152 − 0.10) × 23,000 × $6.75]. In other words, Birdwell's reduction in market share from 10 percent to 8.152 percent cost the company $2,869 in contribution margin.

The impact of changing market size on Birdwell's profits can be assessed through the market size variance. It is $2,025 favorable [(23,000 − 20,000) × 0.10 × $6.75]. This means that the company's contribution margin would have increased by this amount had the actual market share percentage equaled the budgeted market share percentage. Unfortunately for Birdwell, the market share percentage slipped. Still, Birdwell is better off due to increasing market size, since a market share of 8.2 percent would yield even smaller profits from a smaller market.

While the contribution margin variances and the market share and market size variances yield important insights into profitability, companies may want to analyze profit further. The next section examines another dimension of profitability by looking at profit over the product life cycle.

OBJECTIVE 7

Discuss the variations in price, cost, and profit over the product life cycle.

The Product Life Cycle

Many products have a predictable profit or product life cycle. Using the marketing viewpoint, the **product life cycle** describes the profit history of the product according to four stages: introduction, growth, maturity, and decline. In the introductory phase, profits are low for two reasons. First, revenues are low as the product gains market acceptance. Second, investment and learning may be high, leading to higher expenses. The growth stage is characterized by increasing market acceptance and sales, as well as economies of scale, which bring down expenses. The product breaks even, and profit rises. In the maturity phase, profits stabilize. The product has found its market, and revenues are relatively stable. Investment is down, and all learning effects in production are realized, leading to stable costs. Finally, in the decline phase, the product reaches the end of its cycle, and revenues and profits decline. Costs may still be low, but not enough to slip in below sales. Exhibit 19-13, on the following page, illustrates the interaction of profit and the product life cycle with its four stages.

The product life cycle helps marketers understand the different competitive pressures on a product in each stage. Thus, it is important for planning purposes. The regularities in manufacturing, costs, and profit make the product life cycle just as important in cost management. Each stage of the product life cycle demonstrates a fairly predictable impact on various types of costs. Exhibit 19-14, on the following page, summarizes these effects.

EXHIBIT 19-13 Product Life Cycle

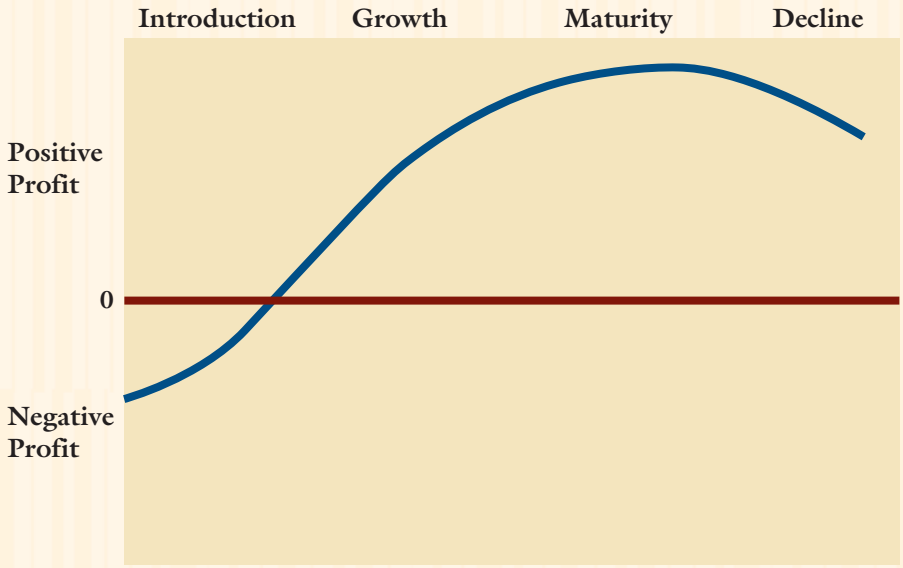

EXHIBIT 19-14 Impact of the Product Life Cycle on Cost Management

	Introduction	Growth	Maturity	Decline
Product	Basic design, few models	Some improvements, expanding product line	Proliferation of product lines, extensive differentiation	Minimal changes, reduced number of product lines
Learning effects	High costs, much learning, but little payoff	Still strong, learning begins to reduce costs	Stable production, little to no learning	No learning, labor as efficient as it can be
Setups	Few, but new and unfamiliar	More, as new models are introduced	Many, as product differentiation occurs	Fewer, as only best selling lines are produced
Purchasing	May be high as new materials and suppliers are sought	Lower, reliable suppliers found, few material changes	May be high depending on line changes	Fewer suppliers and orders as existing inventories are liquidated
Marketing expense	Low selling and distribution costs to small number of target markets	Increased advertising and distribution	Supportive advertising, increased trade discounts, high distribution cost	Minimal advertising, distribution, and promotion

How long is the product life cycle? That depends on the product and the environment that the product faces. Television took years to reach maturity, partially due to its introduction during World War II, when necessary technical assets were diverted to the war effort. Video games typically reach maturity very quickly—in a matter of months. Fad products, such as Sourballs, may zip through the product life cycle in a matter of weeks.

Knowledge of the product life cycle is important for cost management. We can easily see the impact of the four stages on marketing and the growth and decline of sales. Less obvious is the impact on the cost side. Manufacturing must be aware of the impact of newness on costs. Any time a new product is introduced, there are learning effects. In other words, as a company makes more of the product, the employees become better at making it. Purchasing locates and becomes familiar with suppliers of the needed materials. Manufacturing learns to set up more quickly and efficiently the equipment for a new batch. The industrial engineers are able to "work the bugs out" of the process. The whole production process smoothes out and becomes faster and more efficient—and less expensive. However, that is not the whole story. As we can see in Exhibit 19-14, the maturity phase is marked by extensive product differentiation as line extensions proliferate. **Mattel**'s Barbie is over 50 years old—but we're not just talking basic Barbie anymore. Barbie has changed. Her arms and legs are bendable, and her hair is any number of lengths and colors. She has a dizzying array of outfits and accessories. Each version requires different materials and setups. In addition, Barbie and ex-boyfriend Ken have lots of friends—each with different production requirements. According to Mattel, every second, three Barbie dolls are sold somewhere in the world. With each decade's new cohort of little girls, Barbie, Cali (California Barbie), and new boyfriend Blaine may be in the maturity phase for quite some time to come.[14]

The product life cycle has implications for activity-based costing. Recall that ABC categories are unit level, batch level, product level, and facility level. Unit-level costs are highest in the introduction phase, as new materials are sought in small order quantities. In addition, direct labor is higher per unit as labor learns how to manufacture the new item. Unit-level costs begin to fall in the growth phase as learning takes effect and quantity discounts on materials may occur. Similarly, the maturity phase should lead to stable unit-level costs. The decline phase, with fewer units produced, does not enjoy quantity discounts, but unit costs may remain low due to the liquidation of existing inventories and the avoidance of increasing prices.

Batch-level costs follow a similar pattern. Purchasing, receiving, setups, and inspection are high in the introductory phase due to unfamiliarity. In the growth phase, batch-level costs should decrease as the positive impact of learning occurs. Workers are better able to execute setups, for example. In the maturity phase, batch-level costs may increase as product differentiation occurs. Setup number and complexity increase, purchasing orders rise, and inspection costs may increase. Finally, in the decline stage, batch-level costs again fall as product lines are streamlined to just a few best-selling lines and batches decrease in number and complexity.

Product-level costs are highest in the introductory phase and generally fall throughout the rest of the life cycle—with possible spikes upward for new models in the maturity phase. An example is engineering change orders, which occur most frequently when the product is started into production. Facility-level costs may or may not be affected unless the product calls for a new facility or equipment—then they are highest in the introductory phase. Exhibit 19-15, on the following page, depicts the general direction of costs in the ABC categories throughout the product life cycle.

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14. "It's Splitsville for Barbie and Ken: Couple 'will remain friends,' says Mattel," http://www.cnn.com/2004/US/02/12/offbeat.barbie.breakup.ap/ as of February 12, 2004.

EXHIBIT 19-15 Product Life-Cycle Costs in the ABC Categories

ABC Category	Product Life-Cycle Phase			
	Introduction	Growth	Maturity	Decline
Unit-level costs	High	Lower	Low to stable	Low
Batch-level costs	High	Lower	Higher	Low
Product-level costs	High	Lower	Low to stable	Low
Facility-level costs	High	Low	Low	Low

Limitations of Profit Measurement

OBJECTIVE 8

Describe some of the limitations of profit measurement.

Most people think the entire purpose of business is to make a profit. But profit is no more the purpose of business than eating is the purpose of living. Both are essential, but neither is the point of the exercise. Business survives because it continually creates a better world for itself.[15]

As the above quotation suggests, profit measurement is important, and accountants can genuinely help a business by measuring profit levels. Still, there is more to life and business than monetary profit measurement. In this section, we look at the limitations of profit measurement.

One limitation to profitability analysis is its focus on past, not future, performance. The economic environment is unpredictable, and consistent profitability—brought about by great management, productive employees, and a high-quality product—does not guarantee success when economic conditions change. At that point, shifts in strategy may prove crucial. For example, the shift from payment for costs incurred to payment by diagnosis code has changed life considerably in the health care industry. Previously, insurance companies and the federal government paid doctors and hospitals for all costs incurred. Clearly, cost cutting was not important. Now, the emphasis on efficiency and cost control has had a significant impact on all participants in the medical field. **Johnson & Johnson**, for example, worked hard to change the rate of reimbursement for stents used in angioplasty. The J&J stent was technically superior to others on the market and cost more. However, Medicare paid hospitals the same amount no matter which stent was used. J&J was able to show, using data on 200,000 Medicare patients, that patients using the J&J stent were able to avoid a second and third angioplasty. Stent reimbursement increased.[16] The point is that companies must remain flexible and be aware of changing business conditions.

The savvy cost manager is aware of economic and environmental trends outside the company. These can determine the success of management plans. They also help provide a reference point for management in determining whether profits are good or bad. A small increase in profit during a recession may signal outstanding performance. The same increase during economic expansion raises doubts about management's ability.

Another limitation is profit's emphasis on quantifiable measures. Henry Ford said that both buyer and seller must be wealthier in some form as a result of a transaction.

15. Thomas Petzinger, Jr., "For Barbara Vasaris, Part of the Profit Is Helping Kids Learn," *The Wall Street Journal* (June 12, 1998): B1.
16. Ron Winslow, "Johnson & Johnson Misses Beat with Device for Cardiac Surgery," *The Wall Street Journal* (September 18, 1998): A1.

But must wealth always be measured in money? Some aspects of profit are, no doubt, qualitative. Start-up companies may be thrilled to have made it past the 1-year mark. The confidence that comes with being able to successfully start and continue a business is part of their wealth. Many companies give back a portion of their profits to their communities; this, too, is a form of wealth.

The quote from the beginning of this section was taken from an article on **The Anderson Group**, a small network installation firm in Akron, Ohio. The Anderson Group's founder, Barbara Vasaris, hires generalists who are committed to service. One technician who had left for a higher-paying job with another company returned because "[he] felt as though [he] no longer made a difference in people's lives."[17] The Anderson Group deliberately takes low-return jobs with school districts, deciding that overall profit, not per-job profit, is most important.

Finally, we must remember that profit has a strong impact on people's behavior. Predictably, individuals prefer profit to loss. Their jobs, promotions, and bonuses may depend on the annual profit, and this dependence can affect their behavior in expected and unexpected ways. As accountants, it is important to realize that profit measurement can lead to different incentives for individuals to work harder and to act ethically.

People's desire to avoid losses and their inclination to take a short-run perspective can affect the potential for unethical conduct. Unethical conduct can take any number of forms, but basically it comes down to lying. Companies may try to pass off inferior work or materials as high-quality work—worthy of a higher price. Companies may keep two sets of books—for the purpose of cheating on income and inventory taxes. They may overstate the value of inventory in order to understate the cost of goods sold and thereby overstate net income.

Companies that value numerical profit above all else should not be surprised if employees act accordingly and do what is in their power to increase the numbers. Not only does this overreliance on numerical profit lead to unethical behavior, but it also provides incentives to ignore the less measurable outcomes which might benefit the company. Workers basically look for companies to "put their money where their mouth is." If raises, promotions, and bonuses are awarded only on the basis of profit, employees will work to increase profits. Even if the company says other factors are important (e.g., good corporate citizenship, innovation, and high-quality products), this will be seen as mere lip service.

The ever-present salience of monthly, quarterly, and annual profit and loss statements may cause companies to emphasize short-run results. Too much emphasis on short-run optimization can lead to ethical problems. A solution is to focus on the long run. Companies that take a long-run orientation know that they cannot cheat customers and expect to retain their business. Eventually, shoddy materials and workmanship will be realized by the customer. The customer will go elsewhere, and regaining trust once lost is an agonizingly slow process. As a result, ethical people and companies often emphasize the long run as the best basis for behavior.

17. Petzinger, *op. cit.*

SUMMARY

Many considerations factor into the determination of price. Economic considerations include customer demand, price elasticity of demand, and market structure. In general, customers buy less at a high price than they do at a low price. Price elasticity of demand

may vary from elastic to inelastic. When demand is inelastic, a price change has relatively little effect on quantity demand. The opposite holds for elastic demand. Market structure affects the firm's degree of freedom to change price.

Most American firms use cost-based pricing. First, cost is determined, and then, a desired profit is added to calculate price. This strategy does not take demand into account until late in the process, when the resulting price is considered in reference to demand and competition. The target cost-based pricing strategy, on the other hand, begins with price, then works backward to calculate a cost which will allow the firm to achieve a desired profit. This strategy is proving to be more successful.

The legal system, to an extent, supports competition. As a result, certain business practices are outlawed. Predatory pricing and certain types of price discrimination are illegal. Fairness and ethical conduct prevent the exploitation of market power in certain instances. Price gouging and dumping are considered to be unfair.

Various measures of profit have been suggested. Absorption-costing income measurement is required for external financial reporting. Variable costing and ABC give better signals regarding performance and incremental costs.

Profitability analysis can be accomplished for individual segments. These segments include product lines, divisions, and customer groups. Each analysis adds to management understanding.

Profit-related variances are computed to analyze the changes in profit from one time period to another. The sales price and price volume variances are used to analyze changes in revenue by decomposing revenue into price and quantity sold. The contribution margin variances and market share and size variances are also used to analyze changes in profit.

The product life cycle has an important impact on price. Price cannot be determined from the stage of the life cycle alone, but when used in conjunction with other influences, pricing strategies emerge.

Limitations of profit include focus on past performance, uncertain economic conditions, and the difficulty of capturing all important factors in financial measures. Successful firms measure far more than accounting profit. They are aware of their impact on the community and on their employees. Ethical behavior is fostered by appropriate emphasis on profit.

REVIEW PROBLEMS AND SOLUTIONS

1 PRICING

Melcher Company produces and sells small household appliances. A few years ago, it designed and developed a new hand-held mixer, named the "Mixalot." The Mixalot can be used to mix milkshakes and light batter. With the mincer attachment, it can mince up to a cup of vegetables or fruits. The Mixalot was very different from the standard table model Melcher mixer. Because of this, over $250,000 was spent on design and development. Another $50,000 was spent on consumer focus groups, in which prototypes of the Mixalot were kitchen tested by consumers. It was in those groups that safety problems surfaced. For example, one of the testers sliced his hand. This necessitated adding a plastic guard around the blade. Molding and attaching the blade would add $1.50 to prime costs of the Mixalot, which had originally been estimated to cost $3.50 to produce. Information regarding the first five years of operations is as follows:

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Unit sales	25,000	150,000	400,000	400,000	135,000
Price	$15	$20	$20	$18	$15
Prime cost	$125,000	$600,000	$1,640,000	$1,640,000	$526,500
Setup cost	$5,000	$9,600	$80,000	$80,000	$12,000
Purchase of special equipment	$65,000	—	—	—	—
Expediting	—	$15,000	$40,000	$35,000	—
Rework	$12,500	$45,000	$60,000	$60,000	$6,750
Other overhead	$50,000	$300,000	$800,000	$800,000	$270,000
Warranty repair	$6,250	$7,500	$10,000	$10,000	$3,375
Commissions (5%)	$18,750	$150,000	$400,000	$360,000	$101,250
Advertising	$250,000	$150,000	$100,000	$100,000	$25,000

During the first year, Melcher's prime costs included the safety guard. The special equipment was for molding and attaching the guard. It had a life of five years with no salvage value.

Required:

1. What is the cost of goods sold per unit for the Mixalot in each of the five years?
2. What marketing expenses were associated with the Mixalot in each of the five years? Calculate them on a per-unit basis.
3. Calculate operating income for the Mixalot in each of the five years. Then, compare all costs to revenues for the Mixalot over the entire product life cycle. Was the Mixalot profitable?
4. Discuss the pricing strategy of Melcher Company for the Mixalot, initially and over the product life cycle.

SOLUTION

1.

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Prime cost	$125,000	$ 600,000	$1,640,000	$1,640,000	$ 526,500
Setup cost	5,000	9,600	80,000	80,000	12,000
Depreciation on special equipment	13,000	13,000	13,000	13,000	13,000
Expediting	—	15,000	40,000	35,000	—
Rework	12,500	45,000	60,000	60,000	6,750
Other overhead	50,000	300,000	800,000	800,000	270,000
Total COGS	$205,500	$ 982,600	$2,633,000	$2,628,000	$ 828,250
Divided by units	÷ 25,000	÷150,000	÷ 400,000	÷ 400,000	÷135,000
Unit COGS	$ 8.22	$ 6.55	$ 6.58	$ 6.57	$ 6.14

2.

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Warranty repair	$ 6,250	$ 7,500	$ 10,000	$ 10,000	$ 3,375
Commissions (5%)	18,750	150,000	400,000	360,000	101,250
Advertising	250,000	150,000	100,000	100,000	25,000
Total marketing expenses	$275,000	$ 307,500	$ 510,000	$ 470,000	$ 129,625
Divided by units	÷ 25,000	÷150,000	÷400,000	÷400,000	÷135,000
Unit marketing expense	$ 11.00	$ 2.05	$ 1.28	$ 1.18	$ 0.96

3.

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Sales	$ 375,000	$3,000,000	$8,000,000	$7,200,000	$2,025,000
Less: COGS	205,500	982,600	2,633,000	2,628,000	828,250
Gross profit	$ 169,500	$2,017,400	$5,367,000	$4,572,000	$1,196,750
Less: Marketing expenses	275,000	307,500	510,000	470,000	129,625
Operating income (loss)	$(105,500)	$1,709,900	$4,857,000	$4,102,000	$1,067,125

Five-year operating income	$11,630,525
Less: Design and development expenses	300,000
Excess of revenue over all costs	$11,330,525

Yes, the Mixalot was profitable over the 5-year cycle, even after the design and development expenses were subtracted. Note that these expenses do not appear on the operating income statement required for external reporting.

4. The initial price set for the Mixalot was $15. This is the lowest price of those charged during the 5-year period. It appears that Melcher Company was using a penetration pricing strategy for the Mixalot. This makes sense given that the Mixalot was not a radically new product, i.e., there were other appliances on the market that could do what the Mixalot could do. There were blenders to mix milkshakes, knives and chopping boards to cut up vegetables, and food processors to mix and chop. Melcher Company needed to get the Mixalot out into actual kitchens to build demand. Notice, too, the large marketing expenditures in the first year to create awareness. This also helps to support price increases down the line. Finally, by the fifth year, the Mixalot is in the declining stage of the product life cycle. Probably other companies have begun producing competing products, and the number of new Mixalots demanded has declined.

2 Absorption and Variable Costing, Segmented Income Statements

Acme Novelty Company produces coin purses and key chains. Selected data for the past year are as follows:

	Coin Purse	*Key Chain*
Production (units)	100,000	200,000
Sales (units)	90,000	210,000
Selling price	$5.50	$4.50
Direct labor hours	50,000	80,000
Manufacturing costs:		
Direct materials	$ 75,000	$100,000
Direct labor	250,000	400,000
Variable overhead	20,000	24,000
Fixed overhead	50,000	80,000
Nonmanufacturing costs:		
Variable selling	30,000	60,000
Direct fixed selling	35,000	40,000
Common fixed selling*	25,000	25,000

*Common fixed selling cost totals $50,000 and is divided equally between the two products.

Budgeted fixed overhead for the year, $130,000, equaled the actual fixed overhead. Fixed overhead is assigned to products using a plantwide rate based on expected direct labor hours, which were 130,000. The company had 10,000 key chains in inventory at the beginning of the year. These key chains had the same unit cost as the key chains produced during the year.

Required:

1. Compute the unit cost for the coin purses and key chains using the variable-costing method. Compute the unit cost using absorption costing.
2. Prepare an income statement using absorption costing.
3. Prepare an income statement using variable costing.
4. Explain the reason for any difference between absorption- and variable-costing operating incomes.
5. Prepare a segmented income statement using products as segments.

SOLUTION

1. Unit cost for the coin purse is as follows:

Direct materials ($75,000/100,000)	$0.75
Direct labor ($250,000/100,000)	2.50
Variable overhead ($20,000/100,000)	0.20
Variable cost per unit	$3.45
Fixed overhead [(50,000 × $1.00)/100,000]	0.50
Absorption cost per unit	$3.95

The unit cost for the key chain is as follows:

Direct materials ($100,000/200,000)	$0.50
Direct labor ($400,000/200,000)	2.00
Variable overhead ($24,000/200,000)	0.12
Variable cost per unit	$2.62
Fixed overhead [(80,000 × $1.00)/200,000]	0.40
Absorption cost per unit	$3.02

Notice that the only difference between the two unit costs is the assignment of the fixed overhead cost. Notice also that the fixed overhead unit cost is assigned using the predetermined fixed overhead rate ($130,000/130,000 direct labor hours = $1 per direct labor hour). For example, the coin purses used 50,000 direct labor hours and so receive $1 × 50,000, or $50,000, of fixed overhead. This total, when divided by the units produced, gives the $0.50 per-unit fixed overhead cost. Finally, observe that variable nonmanufacturing costs are not part of the unit cost under variable costing. For both approaches, only manufacturing costs are used to compute the unit costs.

2. The income statement under absorption costing is as follows:

Sales [($5.50 × 90,000) + ($4.50 × 210,000)]	$1,440,000
Less: Cost of goods sold [($3.95 × 90,000) + ($3.02 × 210,000)]	989,700
Gross margin	$ 450,300
Less: Selling expenses*	215,000
Operating income	$ 235,300

*The sum of selling expenses for both products.

3. The income statement under variable costing is as follows:

Sales [($5.50 × 90,000) + ($4.50 × 210,000)]	$1,440,000
Less variable expenses:	
Variable cost of goods sold [($3.45 × 90,000) + ($2.62 × 210,000)]	(860,700)
Variable selling expenses	(90,000)
Contribution margin	$ 489,300
Less fixed expenses:	
Fixed overhead	(130,000)
Fixed selling	(125,000)
Operating income	$ 234,300

4. Variable-costing income is $1,000 less ($235,300 − $234,300) than absorption-costing income. This difference can be explained by the net change of fixed overhead found in inventory under absorption costing.

Coin purses:	
Units produced	100,000
Units sold	90,000
Increase in inventory	10,000
Unit fixed overhead	× $0.50
Increase in fixed overhead	$ 5,000
Key chains:	
Units produced	200,000
Units sold	210,000
Decrease in inventory	(10,000)
Unit fixed overhead	× $0.40
Decrease in fixed overhead	$ (4,000)

The net change is a $1,000 ($5,000 − $4,000) increase in fixed overhead in inventories. Thus, under absorption costing, there is a net flow of $1,000 of the current period's fixed overhead into inventory. Since variable costing recognized all of the current period's fixed overhead as an expense, variable-costing income should be $1,000 lower than absorption-costing income, as it is.

5. Segmented income statement:

	Coin Purses	*Key Chains*	*Total*
Sales	$ 495,000	$ 945,000	$1,440,000
Less variable expenses:			
Variable cost of goods sold	(310,500)	(550,200)	(860,700)
Variable selling expenses	(30,000)	(60,000)	(90,000)
Contribution margin	$ 154,500	$ 334,800	$ 489,300
Less direct fixed expenses:			
Fixed overhead	(50,000)	(80,000)	(130,000)
Direct selling expenses	(35,000)	(40,000)	(75,000)
Product margin	$ 69,500	$ 214,800	$ 284,300
Less common fixed expenses:			
Common selling expenses			(50,000)
Operating income			$ 234,300

KEY TERMS

Absorption costing 834
Arbitrage 825
Contribution margin variance 847
Contribution margin volume variance 847
Dumping 830
Elastic demand 824
Inelastic demand 824
Market share 848
Market share variance 849
Market size 848
Market size variance 849
Markup 826
Monopolistic competition 825
Monopoly 825
Oligopoly 825
Penetration pricing 829
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Price volume variance 846
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Sales mix variance 848
Sales price variance 846
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Variable costing 836

QUESTIONS FOR WRITING AND DISCUSSION

1. Define *elastic demand*. Define *inelastic demand*. Give an example of a product with relatively elastic demand and an example of a product with relatively inelastic demand. (Give examples not given in the text.)
2. What are the features of a perfectly competitive market? Give two examples of competitive markets. How could a firm in such a market move to a less competitive market?
3. How do you calculate the markup on cost of goods sold? Is the markup pure profit? Explain.
4. How does target costing differ from traditional costing? How does a target cost relate to price?
5. What is the difference between penetration pricing and price skimming?
6. Why do gas stations in the middle of town typically charge a little less for gasoline than do gas stations located on interstate highway turnoffs?
7. What is price discrimination? Is it legal?
8. Why do firms measure profit? Why do regulated firms care about the level of profit?
9. What is a segment, and why would a company want to measure profits of segments?
10. Suppose that Alpha Company has four product lines, three of which are profitable and one (let's call it "Loser") which generally incurs a loss. Give several reasons why Alpha Company may choose not to drop the Loser product line.
11. How does absorption costing differ from variable costing? When will absorption-costing operating income exceed variable-costing operating income?
12. What are some advantages and disadvantages of using net income as a measure of profitability?
13. Why do some firms measure customer profitability? In what situation(s) would a firm not want to measure customer profitability?
14. What variances do managers use in trying to understand the difference between actual and planned revenue?
15. Describe the product life cycle. How do unit-level costs behave in relation to the product life cycle? Batch-level costs? Product-level costs? Facility-level costs?

EXERCISES

19-1 Elasticity of Demand and Market Structure

LO1 Janet Gordon and Phil Hopkins graduated several years ago with M.S. degrees in accounting and set up a full-service accounting firm. Janet and Phil have many small business clients and have noticed some pricing trends while compiling annual financial statements. The following data are for five of the pizza parlors which are Janet and Phil's clients:

	Quantity Sold	*Average Price*
Mamma Mia's	18,000	$10.00
Happy Time Pizza	21,000	7.90
Keg and Pie Pizza	22,000	8.00
Fast Freddy's Pizza	30,000	7.00
Pizza-pizza	24,000	7.50

Required:

1. Is the demand for pizza relatively more elastic or inelastic?
2. What type of market structure characterizes the pizza industry? How do you suppose that Mamma Mia's can charge so much more per pizza than Fast Freddy's does?

19-2 Demand Curve and Characteristics of Market Structure

LO1 Amy Chang wants to start a business supplying florists with field-grown flowers. She has located an appropriate acreage and believes she can grow daisies, asters, chrysanthemums, carnations, and other assorted types during a 9-month growing period. By growing the flowers in a field as opposed to a greenhouse, Amy expects to save a considerable amount on herbicide and pesticide. She is considering passing the savings along to her customers by charging $1.25 per standard bunch versus the prevailing price of $1.50 per standard bunch.

Amy has turned to her neighbor, Bob Winters, for help. Bob is an accountant in town who is familiar with general business conditions. Bob gathered the following information for Amy.

a. There are 50 growers within a 1-hour drive of Amy's acreage.
b. In general, there is little variability in price. Flowers are treated as commodities, and one aster is considered to be pretty much like any other aster.
c. There are numerous florists in the city, and the amount that Amy would supply could be easily absorbed by the florists at the prevailing price.

Required:

1. What type of market structure characterizes the flower-growing industry in Amy's region? Explain.
2. Given your answer to Requirement 1, what price should Amy charge per standard bunch? Why?

19-3 Basics of Demand, Life-Cycle Pricing

LO1, LO2 Foster Hancock is an accountant just ready to open an accounting firm in his hometown. He has heard that established accountants in town charge $65 per hour. That

sounds good to Foster. In fact, he believes that he should be able to charge $75 an hour given his high GPA and the fact that he is up to date on current accounting issues.

Required:

Should Foster charge $75 per hour? What would you advise him to do?

19-4 Markup on Cost, Cost-Based Pricing

LO2 Walker Construction acts as the general contractor on building projects ranging from $500,000 to $5 million. Each job requires a bid that includes Walker's direct costs and subcontractor costs as well as an amount referred to as "overhead and profit." Walker's bidding policy is to estimate the direct materials cost, direct labor cost, and subcontractors' costs. These are totaled, and a markup is applied to cover overhead and profit. In the coming year, the company believes it will be the successful bidder on 10 jobs with the following total revenues and costs:

Revenue		$23,580,000
Direct materials	$6,500,000	
Direct labor	4,316,000	
Subcontractors	8,834,000	19,650,000
Overhead and profit		$ 3,930,000

Required:

1. Given the preceding information, what is the markup percentage on total direct costs?
2. Suppose Walker is asked to bid on a job with estimated direct costs of $980,000. What is the bid? If the customer complains that the profit seems pretty high, how might Walker counter that accusation?

19-5 Markup on Cost

LO2 Many different businesses employ markup on cost to arrive at a price. For each of the following situations, explain what the markup covers and why it is the amount that it is.

a. Department stores have a markup of 100 percent of purchase cost.
b. Jewelry stores charge anywhere from 100 percent to 300 percent of the cost of the jewelry. (The 300 percent markup is referred to as "keystone.")
c. Johnson Construction Company charges 12 percent on direct materials, direct labor, and subcontracting costs.
d. Hamilton Auto Repair charges customers for direct materials and direct labor. Customers are charged $45 per direct labor hour worked on their job; however, the employees actually cost Hamilton $15 per hour.

19-6 Absorption and Variable Costing with Over- and Underapplied Overhead

LO4 Abruzzi, Inc., has just completed its first year of operations. The unit costs on a normal costing basis are as follows:

Manufacturing costs (per unit):	
Direct materials (2 lbs. @ $3.50)	$ 7.00
Direct labor (0.5 hr. @ $16)	8.00
Variable overhead (0.5 hr. @ $6)	3.00
Fixed overhead (0.5 hr. @ $9)	4.50
Total	$22.50

(continued)

Selling and administrative costs:	
Variable	$3 per unit
Fixed	$123,000

During the year, the company had the following activity:

Units produced	24,000
Units sold	21,300
Unit selling price	$35
Direct labor hours worked	12,000

Actual fixed overhead was $12,000 less than budgeted fixed overhead. Budgeted variable overhead was $5,000 less than the actual variable overhead. The company used an expected actual activity level of 24,000 direct labor hours to compute the predetermined overhead rates. Any overhead variances are closed to Cost of Goods Sold.

Required:

1. Compute the unit cost using:
   a. Absorption costing
   b. Variable costing
2. Prepare an absorption-costing income statement.
3. Prepare a variable-costing income statement.
4. Reconcile the difference between the two income statements.

19-7 Variable Costing, Absorption Costing

LO4

During its first year of operations, Snobegon, Inc., (located in Lake Snobegon, Minnesota) produced 30,000 plastic snow scoops. Snow scoops are oversized shovel-type scoops that are used to push snow away. Unit sales were 29,000 scoops. Fixed overhead was applied at $0.75 per unit produced. Fixed overhead was underapplied by $3,000. This fixed overhead variance was closed to Cost of Goods Sold. There was no variable overhead variance. The results of the year's operations are as follows (on an absorption-costing basis):

Sales (29,000 units @ $18)	$522,000
Less: Cost of goods sold	304,600
Gross margin	$217,400
Less: Selling and administrative expenses (all fixed)	190,000
Operating income	$ 27,400

Required:

1. Give the cost of the firm's ending inventory under absorption costing. What is the cost of the ending inventory under variable costing?
2. Prepare a variable-costing income statement. Reconcile the difference between the two income figures.

19-8 Cost-Based Pricing, Target Pricing

LO2

Carina Franks operates a catering company in Austin, Texas. Carina provides food and servers for parties. She also rents tables, chairs, dinnerware, glassware, and linens. Estefan and Maria Montero have contacted Carina about plans for their soon-to-be 15-year-old daughter's Quineanera (a festive party thrown by Hispanic parents to celebrate their daughters' fifteenth birthdays). The Monteros would like a catered affair on the lawn of a rural church. They have requested an open bar, a sit-down dinner for 350 people, a large tent, and a dance floor. Of course, they expect Carina to supply serving staff, tables with linens, dinnerware, and glassware. They will handle the flowers, decorations, and hiring the band on their own. Carina put together this bid:

Food (350 × $25)	$ 8,750
Beverages (350 × $15)	5,250
Servers (6 × 4 hours × $10)	240
Bartenders (2 × 4 hours × $10)	80
Clean-up staff (3 × 3 hours × $10)	90
Rental of:	
Dance floor	300
Linens	80
Tables	200
Dinnerware	120
Glassware	150
Total	$15,260

Required:

1. Explain where costs for Carina's services and profit are calculated in the preceding bid.
2. Suppose that the Monteros blanch when they see the preceding bid. One of them suggests that they had hoped to spend no more than $10,000 or so on the party. How could Carina work with the Monteros to achieve a target cost of that amount?
3. Estefan Montero protests the cost of dance floor rental. He says, "I've seen those for rent at U-Rent-It for $75." How would you respond to this remark if you were Carina? (*Hint*: You want this job so telling him "Go ahead and do it yourself, Cheapskate!" is not an option.)

19-9 Cost-Based Pricing

LO2

CMA

Marcus Fibers, Inc., specializes in the manufacture of synthetic fibers that the company uses in many products such as blankets, coats, and uniforms for police and firefighters. Marcus has been in business since 1975 and has been profitable every year since 1983. The company uses a standard cost system and applies overhead on the basis of direct labor hours.

Marcus has recently received a request to bid on the manufacture of 800,000 blankets scheduled for delivery to several military bases. The bid must be stated at full cost per unit plus a return on full cost of no more than 9 percent after income taxes. Full cost has been defined as including all variable costs of manufacturing the product, a reasonable amount of fixed overhead, and reasonable incremental administrative costs associated with the manufacture and sale of the product. The contractor has indicated that bids in excess of $25 per blanket are not likely to be considered.

In order to prepare the bid for the 800,000 blankets, Andrea Lightner, cost accountant, has gathered the following information about the costs associated with the production of the blankets.

Direct materials	$1.50 per pound of fibers
Direct labor	$7.00 per hour
Direct machine costs[a]	$10.00 per blanket
Variable overhead	$3.00 per direct labor hour
Fixed overhead	$8.00 per direct labor hour
Incremental administrative costs	$2,500 per 1,000 blankets
Special fee[b]	$0.50 per blanket
Materials usage	6 pounds per blanket
Production rate	4 blankets per direct labor hour
Effective tax rate	40%

[a]Direct machine costs consist of items such as special lubricants, replacement of needles used in stitching, and maintenance costs. These costs are not included in the normal overhead rates.

[b]Marcus recently developed a new blanket fiber at a cost of $750,000. In an effort to recover this cost, Marcus has instituted a policy of adding a $0.50 fee to the cost of each blanket using the new fiber. To date, the company has recovered $125,000. Lightner knows that this fee does not fit within the definition of full cost, as it is not a cost of manufacturing the product.

Required:

1. Calculate the minimum price per blanket that Marcus Fibers could bid without reducing the company's operating income.
2. Using the full-cost criteria and the maximum allowable return specified, calculate Marcus Fibers's bid price per blanket.
3. Without prejudice to your answer to Requirement 2, assume that the price per blanket that Marcus Fibers calculated using the cost-plus criteria specified is greater than the maximum bid of $25 per blanket allowed. Discuss the factors that Marcus Fibers should consider before deciding whether or not to submit a bid at the maximum acceptable price of $25 per blanket. *(CMA adapted)*

19-10 Life-Cycle Pricing, Sales Price and Price Volume Variances

LO6, LO7

Data for Lorraine Company are as follows:

Budgeted price	$14.30
Actual price	$13.00
Budgeted quantity	1,450
Actual quantity sold	1,400

Required:

1. Calculate the sales price variance.
2. Calculate the price volume variance.
3. Suppose that the product is at the end of the maturity stage of the product life cycle. What information do these two variances provide to Lorraine's managers?

19-11 Pricing Strategy, Sales Variances

LO1, LO6

Howerton, Inc., manufactures and sells three products: K, M, and P. In January, Howerton, Inc., budgeted sales of the following:

	Budgeted Volume	*Budgeted Price*
Product K	110,000	$50
Product M	165,000	20
Product P	20,000	20

At the end of the year, actual sales for Product K and Product M were $5,600,000 and $3,270,000, respectively. The actual price charged for each was equal to the budgeted price. Product P, however, had revenues of $600,000. While total revenue was higher than expected, the actual price of $10 represented a last-minute revision from budget to increase consumer acceptance of the product.

Required:

1. Calculate the sales price and price volume variances for each of the three products based on the original budget.
2. Suppose that Product P is a new product just introduced during the year. What pricing strategy is Howerton, Inc., following for this product?

19-12 Price Discrimination and the Robinson-Patman Act

LO3

For each of the following situations, determine whether or not price discrimination has occurred and whether the Robinson-Patman Act has been violated.

a. Albion Shoes manufactures and sells shoes to retail outlets. A popular women's flat sells for $15 to all customers, FOB shipping from Albion's factory in Menomenee Falls.

b. Dr. Sidney Ferris, an orthopedic surgeon, charges $1,500 for arthroscopic knee surgery to privately insured patients. He charges a greatly reduced rate to other patients.
c. Castle Cosmetics charges a single price for each of its products to all customers, even though Castle can document that it costs up to three times as much to sell and distribute to certain small boutiques.
d. Paxton, Inc., manufactures toothpaste and mouthwash. Paxton charges a higher price to individual drugstores than to large chains because smaller stores do not have the same purchasing power as larger chains.

PROBLEMS

19-13 Price Discrimination

LO3

Bernese, Inc., manufactures and distributes a variety of health products, including velcro-fastened wrist stabilizers for people with carpal tunnel syndrome. Annual production of wrist stabilizers averages 200,000 units. A large chain store purchases about 40 percent of Bernese's production. Several thousand independent retail drugstores and medical supply stores purchase the other 60 percent. Bernese incurs the following costs of production per box:

Direct materials	$2.20
Direct labor	1.05
Overhead	0.75
Total	$4.00

Bernese has one salesperson assigned to the chain store account at a cost of $65,600 per year. Delivery is made in 1,000 unit batches about three times a month at a delivery cost of $600 per batch. Four salespeople service the remaining accounts. They call on the stores and incur salary and mileage expenses of approximately $39,900 each. Delivery costs vary from store to store, averaging $0.45 per unit.

Bernese charges the chain store $6.25 per box and the independent stores $6.50 per box.

Required:

Is Bernese's pricing policy supported by cost differences in serving the two different classes of customer? Support your answer with relevant calculations.

19-14 Unit Costs, Inventory Valuation, Variable and Absorption Costing

LO4

Moyer Company produced 80,000 units during its first year of operations and sold 76,000 at $9 per unit. The company chose practical activity—at 80,000 units—to compute its predetermined overhead rate. Manufacturing costs are as follows:

Direct materials	$240,000
Direct labor	88,000
Expected and actual variable overhead	72,000
Expected and actual fixed overhead	36,000

Required:

1. Calculate the unit cost and the cost of finished goods inventory under absorption costing.

2. Calculate the unit cost and the cost of finished goods inventory under variable costing.
3. What is the dollar amount that would be used to report the cost of finished goods inventory to external parties. Why?

19-15 Income Statements, Variable and Absorption Costing

LO4 The following information pertains to Caesar, Inc., for last year:

Beginning inventory, units	—
Units produced	60,000
Units sold	57,400
Variable costs per unit:	
Direct materials	$9.00
Direct labor	$6.50
Variable overhead	$3.60
Variable selling expenses	$3.00
Fixed costs per year:	
Fixed overhead	$234,000
Fixed selling and administrative expenses	$236,000

There are no work-in-process inventories. Normal activity is 60,000 units. Expected and actual overhead costs are the same.

Required:

1. How many units are in ending inventory?
2. Without preparing an income statement, indicate what the difference will be between variable-costing income and absorption-costing income.
3. Assume the selling price per unit is $32. Prepare an income statement using:
   a. Variable costing
   b. Absorption costing

19-16 Income Statements and Firm Performance: Variable and Absorption Costing

LO4 Zimmer Company had the following operating data for its first two years of operations:

Variable costs per unit:	
Direct materials	$ 5.00
Direct labor	3.00
Variable overhead	1.50
Fixed costs per year:	
Overhead	90,000
Selling and administrative	17,200

Zimmer produced 30,000 units in the first year and sold 25,000. In the second year, it produced 25,000 units and sold 30,000 units. The selling price per unit each year was $15. Zimmer uses an actual costing system for product costing.

Required:

1. Prepare income statements for both years using absorption costing. Has firm performance, as measured by income, improved or declined from Year 1 to Year 2?
2. Prepare income statements for both years using variable costing. Has firm performance, as measured by income, improved or declined from Year 1 to Year 2?
3. Which method do you think most accurately measures firm performance? Why?

19-17 Absorption- and Variable-Costing Income Statements

LO4

CMA

Portland Optics, Inc., specializes in manufacturing lenses for large telescopes and cameras used in space exploration. As the specifications for the lenses are determined by the customer and vary considerably, the company uses a job-order costing system. Manufacturing overhead is applied to jobs on the basis of direct labor hours, utilizing the absorption- or full-costing method. Portland's predetermined overhead rates for 2006 and 2007 were based on the following estimates:

	2006	*2007*
Direct labor hours	32,500	44,000
Direct labor cost	$325,000	$462,000
Fixed manufacturing overhead	$130,000	$176,000
Variable manufacturing overhead	$162,500	$198,000

Jim Bradford, Portland's controller, would like to use variable (direct) costing for internal reporting purposes as he believes statements prepared using variable costing are more appropriate for making product decisions. In order to explain the benefits of variable costing to the other members of Portland's management team, Jim plans to convert the company's income statement from absorption costing to variable costing. He has gathered the following information for this purpose, along with a copy of Portland's 2006–2007 comparative income statement.

Portland Optics, Inc.
Comparative Income Statement
For the Years 2006–2007

	2006	*2007*
Net sales	$1,140,000	$1,520,000
Cost of goods sold:		
Finished goods at January 1	$ 16,000	$ 25,000
Cost of goods manufactured	720,000	976,000
Total available	$ 736,000	$1,001,000
Less: Finished goods at December 31	25,000	14,000
Unadjusted cost of goods sold	$ 711,000	$ 987,000
Overhead adjustment	12,000	7,000
Cost of goods sold	$ 723,000	$ 994,000
Gross profit	$ 417,000	$ 526,000
Selling expenses	(150,000)	(190,000)
Administrative expenses	(160,000)	(187,000)
Operating income	$ 107,000	$ 149,000

Portland's actual manufacturing data for the two years are as follows:

	2006	*2007*
Direct labor hours	30,000	42,000
Direct labor cost	$300,000	$435,000
Direct materials used	$140,000	$210,000
Fixed manufacturing overhead	$132,000	$175,000

The company's actual inventory balances were as follows:

	December 31, 2005	*December 31, 2006*	*December 31, 2007*
Direct materials	$32,000	$36,000	$18,000
Work in process:			
Costs	$44,000	$34,000	$60,000
Direct labor hours	1,800	1,400	2,500
Finished goods:			
Costs	$16,000	$25,000	$14,000
Direct labor hours	700	1,080	550

For both years, all administrative expenses were fixed, while a portion of the selling expenses resulting from an 8 percent commission on net sales was variable. Portland reports any over- or underapplied overhead as an adjustment to the cost of goods sold.

Required:

1. For the year ended December 31, 2007, prepare the revised income statement for Portland Optics, Inc., utilizing the variable-costing method. Be sure to include the contribution margin on the revised income statement.
2. Describe two advantages of using variable costing rather than absorption costing.

(CMA adapted)

19-18 Contribution Margin Variance, Contribution Margin Volume Variance, Sales Mix Variance

LO6

Kingston Company provides management services for apartments and rental units. In general, Kingston packages its services into two groups: basic and complete. The basic package includes advertising vacant units, showing potential renters through them, and collecting monthly rent and remitting it to the owner. The complete package adds maintenance of units and bookkeeping to the basic package. Packages are priced on a per-rental unit basis. Actual results from last year are as follows:

	Basic	*Complete*
Sales (rental units)	700	300
Selling price	$120	$260
Variable expenses	$70	$180

Kingston had budgeted the following amounts:

	Basic	*Complete*
Sales (units)	715	285
Selling price	$110	$275
Variable expenses	$70	$200

Required:

1. Calculate the contribution margin variance.
2. Calculate the contribution margin volume variance. (Round calculations to three decimal places.)
3. Calculate the sales mix variance. (Round calculations to three decimal places.)

19-19 Contribution Margin Variance, Contribution Margin Volume Variance, Market Share Variance, Market Size Variance

LO6

CMA

Patel, Inc., produces and sells gel-filled ice packs. Patel's performance report for April follows:

	Actual	*Budgeted*
Units sold	50,000	40,000
Sales	$350,000	$290,000
Variable costs	225,000	190,000
Contribution margin	$125,000	$100,000
Market size (in units)	1,000,000	1,000,000

Required:

1. Calculate the contribution margin variance and the contribution margin volume variance.
2. Calculate the market share variance and the market size variance. *(CMA adapted)*

19-20 Segmented Income Statements, Analysis of Proposals to Improve Profits

LO4, LO5

Spreadsheet

Shannon, Inc., has two divisions. One produces and sells paper party supplies (napkins, paper plates, invitations); the other produces and sells cookware. A segmented income statement for the most recent quarter is as follows:

	Party Supplies Division	*Cookware Division*	*Total*
Sales	$500,000	$750,000	$1,250,000
Less: Variable expenses	425,000	460,000	885,000
Contribution margin	$ 75,000	$290,000	$ 365,000
Less: Direct fixed expenses	85,000	110,000	195,000
Segment margin	$ (10,000)	$180,000	$ 170,000
Less: Common fixed expenses			130,000
Operating income			$ 40,000

On seeing the quarterly statement, Madge Shannon, president of Shannon, Inc., was distressed and discussed her disappointment with Bob Ferguson, the company's vice president of finance.

MADGE: The Party Supplies Division is killing us. It's not even covering its own fixed costs. I'm beginning to believe that we should shut down that division. This is the seventh consecutive quarter it has failed to provide a positive segment margin. I was certain that Paula Kelly could turn it around. But this is her third quarter, and she hasn't done much better than the previous divisional manager.

BOB: Well, before you get too excited about the situation, perhaps you should evaluate Paula's most recent proposals. She wants to spend $10,000 per quarter for the right to use familiar cartoon figures on a new series of invitations, plates, and napkins and at the same time increase the advertising budget by $25,000 per quarter to let

the public know about them. According to her marketing people, sales should increase by 10 percent if the right advertising is done—and done quickly. In addition, Paula wants to lease some new production machinery that will increase the rate of production, lower labor costs, and result in less waste of materials. Paula claims that variable costs will be reduced by 30 percent. The cost of the lease is $95,000 per quarter.

Upon hearing this news, Madge calmed considerably, and, in fact, was somewhat pleased. After all, she was the one who had selected Paula and had a great deal of confidence in Paula's judgment and abilities.

Required:

1. Assuming that Paula's proposals are sound, should Madge Shannon be pleased with the prospects for the Party Supplies Division? Prepare a segmented income statement for the next quarter that reflects the implementation of Paula's proposals. Assume that the Cookware Division's sales increase by 5 percent for the next quarter and that the same cost relationships hold.
2. Suppose that everything materializes as Paula projected except for the 10 percent increase in sales—no change in sales revenues took place. Are the proposals still sound? What if the variable costs are reduced by 40 percent instead of 30 percent with no change in sales?

19-21 Impact of Inventory Changes on Absorption-Costing Income, Divisional Profitability

LO4, LO5

Dana Baird was manager of a new Medical Supplies Division. She had just finished her second year and had been visiting with the company's vice president of operations. In the first year, the operating income for the division had shown a substantial increase over the prior year. Her second year saw an even greater increase. The vice president was extremely pleased and promised Dana a $5,000 bonus if the division showed a similar increase in profits for the upcoming year. Dana was elated. She was completely confident that the goal could be met. Sales contracts were already well ahead of last year's performance, and she knew that there would be no increases in costs.

At the end of the third year, Dana received the following data regarding operations for the first three years:

	Year 1	*Year 2*	*Year 3*
Production	10,000	11,000	9,000
Sales (in units)	8,000	10,000	12,000
Unit selling price	$10	$10	$10
Unit costs:			
Fixed overhead*	$2.90	$3.00	$3.00
Variable overhead	$1.00	$1.00	$1.00
Direct materials	$1.90	$2.00	$2.00
Direct labor	$1.00	$1.00	$1.00
Variable selling	$0.40	$0.50	$0.50
Actual fixed overhead	$29,000	$30,000	$30,000
Other fixed costs	$9,000	$10,000	$10,000

*The predetermined fixed overhead rate is based on expected actual units of production and expected fixed overhead. Expected production each year was 10,000 units. Any under- or overapplied fixed overhead is closed to Cost of Goods Sold.

	Yearly Income Statements		
	Year 1	*Year 2*	*Year 3*
Sales revenue	$80,000	$100,000	$120,000
Less: Cost of goods sold*	54,400	67,000	86,600
Gross margin	$25,600	$ 33,000	$ 33,400
Less: Selling and administrative expenses	12,200	15,000	16,000
Operating income	$13,400	$ 18,000	$ 17,400

*Assumes a LIFO inventory flow.

Upon examining the operating data, Dana was pleased. Sales had increased by 20 percent over the previous year, and costs had remained stable. However, when she saw the yearly income statements, she was dismayed and perplexed. Instead of seeing a significant increase in income for the third year, she saw a small decrease. Surely, the accounting department had made an error.

Required:

1. Explain to Dana why she lost her $5,000 bonus.
2. Prepare variable-costing income statements for each of the three years. Reconcile the differences between the absorption-costing and variable-costing incomes.
3. If you were the vice president of Dana's company, which income statement (variable-costing or absorption-costing) would you prefer to use for evaluating Dana's performance? Why?

19-22 Ethical Issues, Absorption Costing, Performance Measurement

LO3, LO4, LO8

Bill Fremont, division controller and CMA, was upset by a recent memo he received from the divisional manager, Steve Preston. Bill was scheduled to present the division's financial performance at headquarters in one week. In the memo, Steve had given Bill some instructions for this upcoming report. In particular, Bill had been told to emphasize the significant improvement in the division's profits over last year. Bill, however, didn't believe that there was any real underlying improvement in the division's performance and was reluctant to say otherwise. He knew that the increase in profits was because of Steve's conscious decision to produce for inventory.

In an earlier meeting, Steve had convinced his plant managers to produce more than they knew they could sell. He argued that by deferring some of this period's fixed costs, reported profits would jump. He pointed out two significant benefits. First, by increasing profits, the division could exceed the minimum level needed so that all the managers would qualify for the annual bonus. Second, by meeting the budgeted profit level, the division would be better able to compete for much-needed capital. Bill objected but had been overruled. The most persuasive counterargument was that the increase in inventory could be liquidated in the coming year as the economy improved. Bill, however, considered this event unlikely. From past experience, he knew that it would take at least two years of improved market demand before the productive capacity of the division was exceeded.

Required:

1. Discuss the behavior of Steve Preston, the divisional manager. Was the decision to produce for inventory an ethical one?
2. What should Bill Fremont do? Should he comply with the directive to emphasize the increase in profits? If not, what options does he have?

3. Chapter 1 listed ethical standards for management accountants. Identify any standards that apply in this situation.

19-23 Segmented Income Statements, Adding and Dropping Product Lines

LO5 Louise Bordner has just been appointed manager of Palmroy's Glass Products Division. She has two years to make the division profitable. If the division is still showing a loss after two years, it will be eliminated, and Louise will be reassigned as an assistant divisional manager in another division. The divisional income statement for the most recent year is as follows:

Sales	$5,350,000
Less: Variable expenses	4,750,000
Contribution margin	$ 600,000
Less: Direct fixed expenses	750,000
Divisional margin	$ (150,000)
Less: Common fixed expenses (allocated)	200,000
Divisional profit (loss)	$ (350,000)

Upon arriving at the division, Louise requested the following data on the division's three products:

	Product A	*Product B*	*Product C*
Sales (units)	10,000	20,000	15,000
Unit selling price	$150.00	$140.00	$70.00
Unit variable cost	$100.00	$110.00	$103.33
Direct fixed costs	$100,000.00	$500,000.00	$150,000.00

She also gathered data on a proposed new product (Product D). If this product is added, it would displace one of the current products; the quantity that could be produced and sold would equal the quantity sold of the product it displaces, although demand limits the maximum quantity that could be sold to 20,000 units. Because of specialized production equipment, it is not possible for the new product to displace part of the production of a second product. The information on Product D is as follows:

Unit selling price	$ 70
Unit variable cost	30
Direct fixed costs	640,000

Required:

1. Prepare segmented income statements for Products A, B, and C.
2. Determine the products that Louise should produce for the coming year. Prepare segmented income statements that prove your combination is the best for the division. By how much will profits improve given the combination that you selected? (*Hint*: Your combination may include one, two, or three products.)

19-24 Operating Income for Segments

LO5 Jerrell, Inc., manufactures and sells automotive tools through three divisions: Southwest, Midwest, and Northeast. Each division is evaluated as a profit center. Data for each division for last year are as follows (in thousands of dollars):

	Southwest	*Midwest*	*Northeast*
Sales	$2,300	$1,100	$3,500
Cost of goods sold	1,380	840	2,100
Selling and administrative expenses	300	180	620

Jerrell, Inc., had corporate administrative expenses equal to $250,000; these were not allocated to the divisions.

Required:

1. Prepare a segmented income statement for Jerrell, Inc., for last year.
2. Comment on the performance of each of the divisions.

19-25 Product Profitability

LO5, LO7

Porter Insurance Company has three lines of insurance: automobile, property, and life. The life insurance segment has been losing money for the past five quarters, and Leah Harper, Porter's controller, has done an analysis of that segment. She has discovered that the commission paid to the agent for the first year the policy is in place is 55 percent of the first-year premium. The second-year commission is 20 percent, and all succeeding years a commission equal to 5 percent of premiums is paid. No salaries are paid to agents; however, Porter does advertise on television and in magazines. Last year, the advertising expense was $500,000. The loss rate (payout on claims) averages 50 percent. Administrative expenses equal $450,000 per year. Revenue last year was $10,000,000 (premiums). The percentage of policies of various lengths is as follows:

First year in force	65%
Second year	25
More than two years in force	10

Experience has shown that if a policy remains in effect for more than two years, it is rarely cancelled.

Leah is considering two alternative plans to turn this segment around. Plan 1 requires spending $250,000 on improved customer claim service in hopes that the percentage of policies in effect will take on the following distribution:

First year in force	50%
Second year	15
More than two years in force	35

Total premiums would remain constant at $10,000,000, and there are no other changes in fixed or variable cost behavior.

Plan 2 involves dropping the independent agent and commission system and having potential policyholders phone in requests for coverage. Leah estimates that revenue would drop to $7,000,000. Commissions would be zero, but administrative expenses would rise by $1,200,000, and advertising (including direct mail solicitation) would increase by $1,000,000.

Required:

1. Prepare a variable-costing income statement for last year for the life insurance segment of Porter Insurance Company.
2. What impact would Plan 1 have on income?
3. What impact would Plan 2 have on income?

19-26 Customer Profitability, Life-Cycle Revenue

LO5, LO7

Refer to the original data in **Problem 19-25**. Fred Morton has just purchased a life insurance policy from Porter with premiums equal to $1,500 per year.

Required:

1. Assume Fred holds the policy for one year and then drops it. What is his contribution to Porter's operating income?
2. Assuming Fred holds the policy for three years, what is his contribution to Porter's operating income in the second and third years? Over a 3-year period? What implications does this hold for Porter's efforts to retain policyholders?

19-27 Customer Profitability

LO4

Olin Company manufactures and distributes carpentry tools. Production of the tools is in the mature portion of the product life cycle. Olin has a salesforce of 20. Salespeople are paid a commission of 7 percent of sales, plus expenses of $35 per day for days spent on the road away from home, plus $0.30 per mile. They deliver products in addition to making the sales, and each salesperson is required to own a truck suitable for making deliveries.

For the coming quarter, Olin estimates the following:

Sales	$1,300,000
Cost of goods sold	450,000

On average, a salesperson travels 6,000 miles per quarter and spends 38 days on the road. The fixed marketing and administrative expenses total $400,000 per quarter.

Required:

1. Prepare an income statement for Olin Company for the next quarter.
2. Suppose that a large hardware chain, MegaHardware, Inc., wants Olin Company to produce its new SuperTool line. This would require Olin Company to sell 80 percent of total output to the chain. The tools will be imprinted with the SuperTool brand, requiring Olin to purchase new equipment, use somewhat different materials, and reconfigure the production line. Olin's industrial engineers estimate that cost of goods sold for the SuperTool line would increase by 15 percent. No sales commission would be incurred, and MegaHardware would link Olin to its EDI system. This would require an annual cost of $100,000 on the part of Olin. MegaHardware would pay shipping. As a result, the salesforce would shrink by 80 percent. Should Olin accept MegaHardware's offer? Support your answer with appropriate calculations.

19-28 Segmented Reporting and Variances

LO5, LO6

CMA

Pittsburgh-Walsh Company (PWC) is a manufacturing company whose product line consists of lighting fixtures and electronic timing devices. The Lighting Fixtures Division assembles units for the upscale and mid-range markets. The Electronic Timing Devices Division manufactures instrument panels that allow electronic systems to be activated and deactivated at scheduled times for both efficiency and safety purposes. Both divisions operate out of the same manufacturing facilities and share production equipment.

PWC's budget for the year ending December 31, 2007, follows and was prepared on a business segment basis under the following guidelines:

a. Variable expenses are directly assigned to the incurring division.
b. Fixed overhead expenses are directly assigned to the incurring division.

c. The production plan is for 8,000 upscale fixtures, 22,000 mid-range fixtures, and 20,000 electronic timing devices. Production equals sales.

PWC established a bonus plan for division management that required meeting the budget's planned operating income by product line, with a bonus increment if the division exceeds the planned product-line operating income by 10 percent or more.

PWC Budget
For the Year Ending December 31, 2007
(in thousands of dollars)

	Lighting Fixtures			
	Upscale	*Mid-Range*	*Electronic Timing Devices*	*Total*
Sales	$1,440	$ 770	$ 800	$ 3,010
Variable expenses:				
Cost of goods sold	(720)	(439)	(320)	(1,479)
Selling and administrative	(170)	(60)	(60)	(290)
Contribution margin	$ 550	$ 271	$ 420	$ 1,241
Fixed overhead expenses	140	80	80	300
Segment margin	$ 410	$ 191	$ 340	$ 941

Shortly before the year began, the CEO, Jack Parkow, suffered a heart attack and retired. After reviewing the 2007 budget, the new CEO, Joe Kelly, decided to close the lighting fixtures mid-range product line by the end of the first quarter and use the available production capacity to grow the remaining two product lines. The marketing staff advised that electronic timing devices could grow by 40 percent with increased direct sales support. Increases above that level and increasing sales of upscale lighting fixtures would require expanded advertising expenditures to increase consumer awareness of PWC as an electronics and upscale lighting fixtures company. Joe approved the increased sales support and advertising expenditures to achieve the revised plan. Joe advised the divisions that for bonus purposes the original product-line operating income objectives must be met, but he did allow the Lighting Fixtures Division to combine the operating income objectives for both product lines for bonus purposes.

Prior to the close of the fiscal year, the division controllers were furnished with preliminary actual data for review and adjustment, as appropriate. These preliminary year-end data reflect the revised units of production amounting to 12,000 upscale fixtures, 4,000 mid-range fixtures, and 30,000 electronic timing devices and are presented as follows:

PWC Preliminary Actuals
For the Year Ending December 31, 2007
(In thousands of dollars)

	Lighting Fixtures			
	Upscale	*Mid-Range*	*Electronic Timing Devices*	*Total*
Sales	$ 2,160	$140	$1,200	$ 3,500
Variable expenses:				
Cost of goods sold	(1,080)	(80)	(480)	(1,640)
Selling and administrative	(260)	(11)	(96)	(367)
Contribution margin	$ 820	$ 49	$ 624	$ 1,493
Fixed overhead expenses	140	14	80	234
Segment margin	$ 680	$ 35	$ 544	$ 1,259

The controller of the Lighting Fixtures Division, anticipating a similar bonus plan for 2008, is contemplating deferring some revenues to the next year on the pretext that the sales are not yet final and accruing in the current year expenditures that will be applicable to the first quarter of 2008. The corporation would meet its annual plan, and the division would exceed the 10 percent incremental bonus plateau in 2007 despite the deferred revenues and accrued expenses contemplated.

Required:

1. Outline the benefits that an organization realizes from segment reporting. Evaluate segment reporting on a variable-costing basis versus an absorption-costing basis.
2. Calculate the contribution margin, contribution margin volume, and sales mix variances.
3. Explain why the variances occurred. *(CMA adapted)*

19-29 Collaborative Learning Exercise

LO7

Shangri-La Videos is marketing a new line of wellness-oriented videotapes. These videotapes emphasize proper nutrition, low-impact exercise, and stress reduction techniques. Shangri-La's marketing director (and president), Sherry Benson, believes that a comprehensive marketing campaign to introduce the videotapes will be necessary. Sherry has estimated the following marketing costs:

Commission	3% of undiscounted price
Marketing testing	$7,000 per city
Rebates:	
Fixed cost to print the certificates	$625
Variable cost to redeem each certificate	$7.50
Advertising:	
Quarter 1	$25,000
Quarter 2	$50,000
Quarters 3 through 7	$20,000 per quarter
Quarter 8	none

The market testing will occur during the first quarter. Sherry believes that conducting tests in three cities will be sufficient to gather feedback regarding the video.

Sherry estimates that the total cost of writing the script and producing the master for the videotape will come to $55,000. The cost of copying a new videotape from the master, packaging, and shrink-wrapping it will be $3 per tape. The videotape market is fickle and competitive. Sherry believes that the wellness tape can be sold for eight quarters at the most. Her estimates of unit sales for each quarter are as follows:

Quarter	*Unit Sales*
1	5,000
2	15,000
3	27,000
4	30,000
5	30,000
6	30,000
7	15,000
8	2,000

In Quarters 1 through 7, the videotape will be priced at $20. In Quarter 8, the price will decrease to $10, and no commission will be paid. In Quarter 1, the rebate

certificate will be attached. Customers who buy the videotape and mail in the certificate (with original cash register receipt) will receive $5 by return mail. Past experience indicates that only 25 percent of the customers eligible for the rebate will take advantage of it. (The remaining 75 percent who do not claim the rebate are referred to as "slippage." Companies count on a hefty amount of slippage when offering a generous rebate program.)

Required:

Form groups of three or four. Each group will work this exercise. Be prepared to share with the class the group's discussion of Requirements 1 and 3.

1. Tell which phase of the product life cycle for the wellness videotape applies to each quarter.
2. Prepare income statements for each of the eight quarters. (You may round all amounts to the nearest $1,000.) Is the videotape profitable in each quarter? Overall?
3. List the stages of the product life cycle, and find two products not mentioned in the text that fit into each stage.

19-30 Cyber Research Case

LO7

View the Web site for **SAP** at http://www.mysap.com to see how the company helps other companies improve profitability. Write a brief paper on the companies featured on the SAP site, and tell how the software company's product can improve profits.