

# Part III

# Making Decisions

The 5th Wave

By Rich Tennant



"Gentlemen, we stand on the shoulders  
of accountants."

## *In this part . . .*

**S**ome people groan at the thought of making decisions of any kind, let alone making decisions using cost accounting. But in this part, you learn about cost drivers, activities that cause you to incur costs, and relevance. You also address pricing, compute the cost of your product correctly, and calculate the proper price for your product. It's a good thing you decided to read the chapters in this part, huh?

## Chapter 10

# Cost Drivers and Cost Estimation Methods

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### *In This Chapter*

- ▶ Understanding cost behavior assumptions
  - ▶ Reviewing how costs behave
  - ▶ Using steps to estimate a cost function
  - ▶ Choosing cost drivers
  - ▶ Comparing linear and nonlinear cost functions
- 

**I**f you can understand cost behavior, you can understand and forecast costs. A *cost driver* measures how much cost an activity generates. I've described a cost object in other chapters as a "sponge" that's full of costs. The cost driver adds to the size of the sponge or subtracts from its size.

*Cost behavior* links an activity (such as sales or production) to a cost. *Cost functions* relate a cost to an activity level using a mathematical formula. You use a cost function formula to build a better cost/activity relationship.

This chapter helps you understand cost drivers and the activities that create them. You can use that knowledge to reduce costs and increase your profit. (Ah, that marvelous bottom line — again!) It guides you through the steps to determine a cost driver. And if you get stuck, check out Chapter 4 for more on cost drivers.

## *Working with Cost Behavior*

Costs can be fixed, variable, or mixed. As the terms imply, *fixed costs* don't change with the level of activity, *variable costs* increase or decrease with the level of activity, and *mixed costs* have a fixed cost and a variable cost component. I cover that ground in Chapter 2. Now put the cost behavior in the form of a formula. You can plug levels of activity into the formula and compute the cost. Technically, this is called *plug and chug*. The object is to understand costs and reduce them.

## *Understanding linear and nonlinear cost functions*

As a preliminary, keep in mind that you relate only one cost to one activity at a time. Also, the relationship holds true only in a relevant range of activity. An activity level above the relevant range may not have the same cost function. (See Chapter 2 for details on relevant range.)

Cost functions may be *linear functions* or *nonlinear functions*. A linear function in cost accounting looks almost exactly like the linear function you may have learned in high school algebra:  $f(x) = mx + b$ . If the formula isn't ringing a bell with you, the explanation below should help.

A linear costing function has this form:

$$\text{Total cost} = \text{fixed cost} + (\text{variable cost} \times \text{activity level})$$

Try the formula with the first cellphone billing plan (fixed cost):

$$\text{Total cost} = \$200 + (\$0 \times 0)$$

$$\text{Total cost} = \$200$$

At any level of cellphone use, the cost is \$200.

Next, try the formula with the second billing plan. You used 500 minutes.

$$\text{Total cost} = \$0 + (\$0.05 \times 500)$$

$$\text{Total cost} = \$25.00$$

For variable costs, you multiply the total cellphone minutes used by 5 cents, and there's no fixed cost component.

Here's the formula applied to the third plan, the mixed cost plan:

$$\text{Total cost} = \$50 + (\$0.02 \times 500)$$

$$\text{Total cost} = \$50 + 10.00$$

$$\text{Total cost} = \$60.00$$

If you didn't use any minutes for the month, your cost would be \$50. If you used 500 minutes for the month, you would pay \$60.

All three types of costs fit into the formula; they're all considered linear costs.

If you plot a linear cost function on graph paper, it appears as a straight line (just like in high school). Conversely, a nonlinear cost function is a function where the graph won't be a straight line. Think quantity discount or sliding scale. See the section "Exploring Nonlinear Cost Functions," later in this chapter.

Linear costs increase or decrease at a constant rate. In the variable cost cell phone plan, each minute has a \$0.02 cost. As you use more minutes, the cost increase is a constant \$0.02 per minute. You also see the constant cost increase in the variable component of the mixed cost plan.

## *Discovering how cost drivers determine total costs*

You can't assign costs and compute a total product cost without knowing the cost driver. An activity relates to a cost if there's a cause-and-effect relationship. Each of the following situations is a cause-and-effect relationship:

- ✓ A direct cost (material or labor) can be traced to the product. If you increase your production of denim jeans, you incur more denim material cost. The cause (more jeans production) has the effect of increased spending on denim material.
- ✓ A contract requires that you incur the cost for a particular activity. Assume a customer contract requires you to add six brass buttons to each pair of jeans. That cause (a contract) has the effect of increasing your spending on brass buttons. You also incur machine and labor costs to attach the buttons to the jeans.
- ✓ Based on your industry or product knowledge, you can relate the activity to the cost. Say your outdoor action line of jeans has reinforced stitching. It prevents the jeans from tearing when campers and hikers give them rough use. Based on your product knowledge, you know that labor and machine costs are higher for the outdoor action line than your other lines of jeans. The cause (product line) has the effect of increasing spending on labor costs and machinery.



Almost all activities are related to a cost. A cost and an activity relate only if the cause-and-effect relationship is reasonable. That requires judgment and common sense on your part.

Consider this scenario: You notice that the vast majority of your machine repair costs occur on Fridays, so you decide to do some analysis to see if there's a relationship. On average, your machine use isn't any higher than other days of the week.

Your payroll records tell you that the same employees work each day of the week. There are no differences in staffing between Friday and other days.

Your production manager speculates that breakdowns happen on Fridays because the machines have been running all week. After four prior days of use, they get overheated and tend to break down on Fridays. You don't use the machines over the weekend. By Monday, the machines have cooled back down.

You run machine diagnostics on each Monday and Friday for several weeks and conclude that your manager is correct. The heavy machine use during the week (the cause) results in higher repair costs on Fridays (the effect).

## *Considering Cost Estimation Methods*

Your goal is to select a method to estimate each cost function. You can choose among four good ones. No matter what method you select, you need to collect information, make some assumptions (such as deciding what data are more important and less important), and consider the cost of implementing your cost estimation method.

The goals are simple. You're going after a method you can implement for a reasonable cost and one that gives you useful information to estimate costs. You end up deciding whether the benefit of having the information is worth the cost and time involved to collect it.

### *Walking through the industrial engineering method*

The *industrial engineering method* (also called the *work-measurement method*) relates inputs to outputs. You analyze inputs (material, labor, overhead) and attach them to some level of output. For example, you may determine that five hours of machine time is required to cut and treat 12 square yards of leather to make purses. The input is machine time; the output is the treated leather.

If this sounds time-consuming, it is! Someone (maybe an analyst you hire) has to monitor dozens of inputs to see what comes out on the other end — the outputs. Because of the time and effort involved, this method is no longer widely used. It's also not very effective when estimating overhead costs. As you've seen, overhead costs are hard to judge. They're allocated, not traced, to production.

### *Agreeing on the conference method*

As the name implies, the *conference method* uses a consensus of opinion from people within the company. That consensus view becomes the cost estimate.

There are several benefits. You use the collective knowledge from everyone in the organization. Presumably, that adds experience, and it spreads out the time needed over many people. Because the decision is based on consensus, it may carry greater credibility. Certainly, the group providing input believes in the process and the outcome.

However, the conference method may not yield an accurate cost estimate because the method relies more on opinion and less on analysis. People can include their own biases when they give their opinions.

## *Reviewing the account analysis method*

The *account analysis method* may be the easiest method to understand and implement. There are three steps to this process:

1. Identify the type of activity that is driving the cost.
2. Divide the total costs into fixed, variable and mixed costs. Essentially, you are creating three “buckets” of cost.
3. Plug in the fixed, variable, and mixed cost totals into the cost function formula.

Here’s a simple example. Assume an activity relates to \$100,000 in total cost. You analyze the activity and determine that \$60,000 of the total cost is fixed, and \$40,000 is a variable cost driven by machine hours. You determine that the variable cost per machine hour is \$20 an hour.

Now you can plug the data into the cost function:

$$\text{Total cost} = \text{fixed cost} + (\text{variable cost} \times \text{activity level})$$

$$\text{Total cost} = \$60,000 + (\$20 \times \text{machine hours})$$

You can plug in any level of machine hours and come up with a total cost. Because you’re able to plug the activity and costs into the cost function, it’s a linear function.

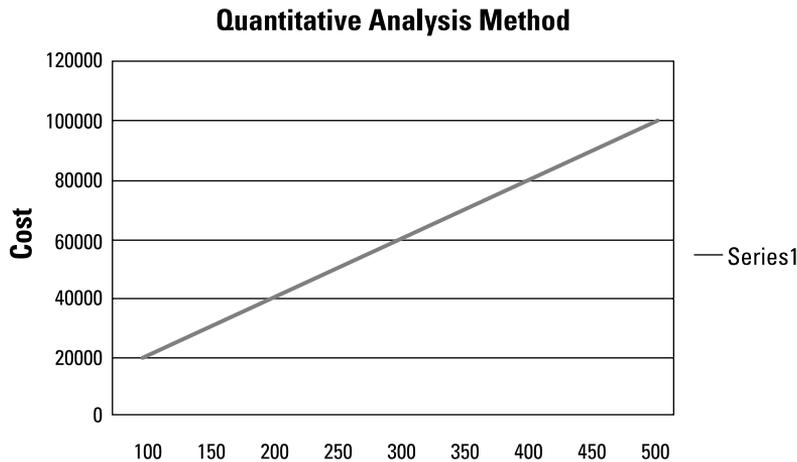
If you created a dollar of cost for a mixed cost, you would post the fixed portion to the fixed part of the cost formula and the variable per unit amount to the variable part of the cost formula.

What you’ve created is a cost function estimate that uses analysis (not just opinion) and is easy to understand. Keep in mind, however, that it’s tough to know with certainty which costs are fixed and which are variable. As with many areas of accounting, you use your best judgment.

## Checking out the quantitative analysis method

The quantitative analysis method uses more math than you've seen so far. You review your historical data, look at activities and costs you've incurred, and then plot the data on a graph.

Say the x-axis is the activity level, which in this case is labor hours. The y-axis is the related cost. For each level of activity on the x-axis, you plot a point for cost on the y-axis. Finally, you use the points on the chart to create a cost function. Figure 10-1 shows a linear function.



**Figure 10-1:**  
Linear  
function.

Bear in mind that the cost function is linear. Moving left to right on the graph, the cost function is a straight line.

### Introducing the high-low method

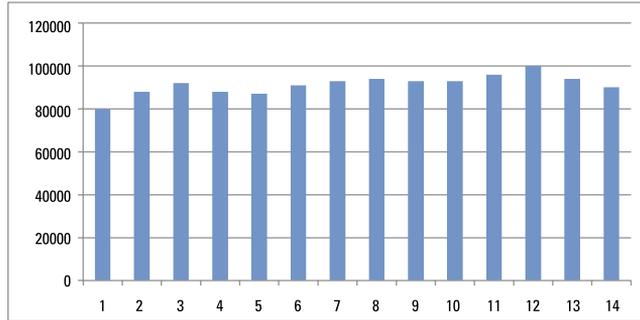
The *high-low method* is the simplest form of the quantitative analysis method. It gives an idea of how quantitative analysis works for accounting analysis. You then know enough (for a beginner) to be dangerous. Going further requires more math and statistics than are discussed in this book.

Say that you're reviewing data for indirect machine cost. The cost driver is machine hours. You have two years of monthly data (24 months). You post each machine hour on the x-axis, find the cost on the y-axis, and plot the points. Figure 10-2 shows the data used. The top chart shows the cost per month. The bottom chart shows machine hours per month.

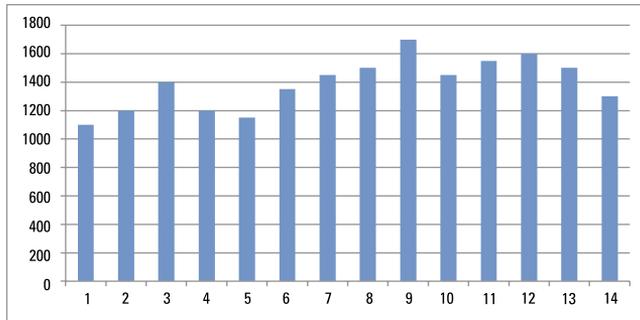
High Point: \$100,000 cost, 1,600 machine hours  
 Low Point: \$80,000 cost, 1,100 machine hours

No outliers

1	80000	1100
2	88000	1200
3	92000	1400
4	88000	1200
5	87000	1150
6	91000	1350
7	93000	1450
8	94000	1500
9	93000	1700
10	93000	1450
11	96000	1550
12	100000	1600
13	94000	1500
14	90000	1300



1	1100
2	1200
3	1400
4	1200
5	1150
6	1350
7	1450
8	1500
9	1700
10	1450
11	1550
12	1600
13	1500
14	1300



**Figure 10-2:**  
Slope  
coefficient.

Your first step is to find the highest and lowest activity (machine hour) points in that 24-month period. That’s the bottom chart. Your next step is to find the cost points that align with the highest and lowest activity levels you selected. You use the top chart for that. Here are your high and low points:

High point: \$100,000 cost; 1,600 machine hours

Low point: \$80,000 cost; 1,100 machine hours

The graph at the bottom of Figure 10-2 displays the total hours for each month. The highest point on the chart is the ninth month. At the point, you see 1,600 machine hours. The lowest point on the same chart is in the 17th month. In that month, you incur 1,100 machine hours.

The high-low method requires you to select the highest and lowest activity *first*. You then use the activity to locate the related costs. The graph at the top of Figure 10-2 relates each month to the indirect machine cost. Sixteen hundred machine hours generate a \$100,000 cost, and the 1,100 machine hours ties to an \$80,000 cost.

Compute a *slope coefficient* and a *constant*. These two numbers provide the high-low estimate of your cost function. Those terms are defined next.

### ***Computing the slope coefficient***

The *slope coefficient* is the cost per machine hour. That's the accounting definition. This term has a math definition, too, but it's not critical to understand it for this cost estimation method.

The difference between highest and lowest cost is \$20,000 (\$100,000 to \$80,000). The highest and lowest machine hour difference is 500 hours (1,600 hours to 1,100 hours). Here's the slope coefficient:

$$\text{Slope coefficient} = \text{cost} \div \text{hours}$$

$$\text{Slope coefficient} = \$20,000 \div 500$$

$$\text{Slope coefficient} = \$40 \text{ per hour}$$

### ***Finding the constant in the cost function***

Now use the slope coefficient and the other data to compute the constant. You need all of this data for your estimate of the cost function. To find the constant, you can use either the highest cost and machine hours or the lowest. Here's the constant formula, using the highest data:

$$\text{Constant (highest data)} = \text{highest cost} - (\text{slope coefficient} \times \text{machine hours})$$

$$\text{Constant (highest data)} = \$100,000 - (\$40 \times 1,600)$$

$$\text{Constant (highest data)} = \$100,000 - (\$64,000)$$

$$\text{Constant (highest data)} = \$36,000$$

You can check your work by plugging the lowest cost and machine hours into the formula. You should get the same dollar amount constant. This formula computes the constant using the lowest cost and machine hours:

$$\text{Constant (lowest data)} = \$80,000 - (\$40 \times 1,100)$$

$$\text{Constant (lowest data)} = \$80,000 - (\$44,000)$$

$$\text{Constant (lowest data)} = \$36,000$$

### ***Estimating the cost function***

Finally, you use the slope coefficient and the constant to compute the high-low estimate of the cost function:

$$\text{Total cost} = \text{fixed cost} + (\text{slope coefficient} \times \text{activity level})$$

$$\text{Total cost} = 36,000 + (\$40 \times \text{activity level})$$

To estimate your cost, you can plug in a number of machine hours and compute a cost estimate.



The high-low estimate of the cost function relies on just two data points. Those points might be unusual — far out of the ordinary. To avoid results that are misleading, consider using a *representative high and low*. Take a look at several of the high costs. If the highest cost is far different from the others (an *outlier*), don't use it in high-low analysis. Use another high cost that is closer to the other results. Do the same thing at the low end.

For example, the month with the highest cost and machine hours was due to unusually high customer demand. Maybe you were ending a product line that was very popular. Customers rushed in to get the product while it was still available, so you were working (and spending) at an unusually high rate.

You could also have a month at the other end of the spectrum. The month with the lowest cost and machine hours was quirky. Say you sell winter coats for hikers and campers. April is normally your slowest production month because the winter season is just about over. In May, you crank up production to meet fall and winter demand.

You have an unusually warm April, so customer demand is lower than expected. Production is low — maybe the lowest ever. If you use your April cost and machine hours for your cost function, your cost estimate would be distorted.

## ***Choosing a cost estimation method***

Now that you've seen several methods for estimating costs, consider some scenarios. You have to consider which cost estimation method to use.

### ***Deciding between two cost drivers***

Typically, the two most common cost drivers for indirect costs are machine hours and manufacturing labor hours. This concept has been addressed several times in the book.

Say that you're selecting a cost driver for machine repair costs. You're thinking about which activity drives the repair cost. Well, it could be machine hours. After all, the more you run the machines, the more likely they are to break down. On the other hand, the best cost driver could be manufacturing labor hours. The more employees you have running the machines, the more the machines break down.

You decide to use quantitative analysis to decide which cost driver is best. Specifically, you apply the high-low method. Compute a cost function for using each cost driver. You have a cost function for repair costs versus machine hours. You also have a cost function for repair costs versus labor hours. If you need to, refer to the section “Estimating the cost function.”

You end up with two formulas. They both look like this:

$$\text{Cost function estimate} = \text{constant} + (\text{slope coefficient} \times \text{number of hours})$$

The constant is the fixed cost portion of the formula. The slope coefficient is the variable portion of the formula. The hours are either labor hours or machine hours. Next, plug values (hours) into the function, and see what your cost estimate is.

You decide on a cost driver by deciding which cost function results look the most reasonable. You're able to see which set of costs is the most plausible, producing outcomes that you'd expect.

You graph manufacturing labor hours cost function. You noticed that the relationship of costs to labor costs is haphazard. There's no pattern or trend that relates the cost to the labor hours.

Your graph of the machine hours, on the other hand, shows a definite trend. As machine hours increase, you see a clear trend of repair costs increasing. Commons sense tells you that machine hours are a more reasonable cost driver for repair costs than manufacturing labor hours.

### ***Juggling cost hierarchies and cost estimation issues***

A cost hierarchy considers different levels of costs. (Take a peek at Chapter 5 for a review.) Consider the difference between a unit cost and a batch cost. Say your company makes auto parts. You produce products in batches. When you change from producing one auto part to producing another part, you incur setup costs (that is, the cost of labor to make changes to the equipment).

Here's the skinny: You need to match the batch cost (setup cost) with the batch-level activity (setup labor hours). Setup costs aren't allocated or traced to a unit; instead, the costs are allocated to a *batch*.

The work process is obvious. Make a batch of parts, stop and do setup, and then make a batch of a different parts. There could be 2 units in a batch or 200. In either case, the setup time would be the same, because the batch process drives it.

By contrast, metal costs for your product are a unit cost. You trace material costs to each unit. (And direct costs have been covered many times in this book.) You can picture each auto part produced using metal material. So you trace material costs at the *unit* level.

## ***Exploring Nonlinear Cost Functions***

In the section “Checking out the quantitative analysis method,” earlier in this chapter, you saw a definition of the linear cost function. Moving left to right on the graph, a linear cost function is a straight line.

However (there’s always a “however”), not all cost functions are linear. There are *nonlinear cost functions*, too. With a nonlinear cost function, the graph line isn’t straight. You need to distinguish between linear and nonlinear cost functions.

### ***Changing cost functions and slope coefficients***

With a nice, tame linear cost function, *the slope coefficient is constant*. It may be fairly shallow (making copper ingots) or steep (making platinum door-stops). But here’s the deal with a nonlinear cost function: At various points along the x-axis, *the slope coefficient changes*. The change might look like a curve, or it might be a dramatic jag. When you see examples, nonlinear cost functions make sense.

### ***Understanding the impact of quantity discounts***

Say you’re buying material (metal) for your auto parts production process. Picture a graph with square feet of material on the x-axis and cost on the y-axis. From 0 to 10,000 square feet, you pay \$5 per pound. The slope coefficient is a straight line. As you order more material, the cost increases at a constant rate. The cost function is a straight line.

When you order more than 10,000 square feet in a month, your supplier offers you a quantity discount. From 10,001 to 20,000 square feet purchased, you pay \$3.50 per pound. Your slope coefficient has changed. The cost function line isn’t as steep in the 10,001- to 20,000-square-foot range. If the discount got larger (say for material purchases between 20,001 and 30,000 square feet per month), the slope of the line would flatten even more.

And quantity discounts are common; they encourage customers to order more product. If you’re a buyer, your average cost declines. If you pay for a portion of the metal at \$5 per pound and then pay \$3.50 per pound for more, your average cost is less than \$5. Because the cost function line changes along the way, the cost function is nonlinear.

## Assessing the Impact of Learning Curves

A *learning curve* is a cost function that measures how your labor costs per unit decline as production increases. Decline? Yes! That's because as your employees learn more about the tasks they're doing, they get better at doing them. They may take less effort, and the employees can perform them faster. When that happens, productivity increases and your labor cost per unit declines.

*Learning curve* may also refer to costly lessons that real life teaches. A friend of mine often says, "Nothing is wasted." Any experience in business — even one that seems awful — can be a learning experience. Even if your response is "I'll never do that again," you've still learned something.



"Experience keeps a dear [costly] school, but fools will learn in no other" (Benjamin Franklin, *Poor Richard's Almanac*, 1743). If possible, try to learn from *somebody else's* experience.

As a manager, you can improve your decision-making due to the learning curve. As production increases, you improve how you schedule your work. Maybe you realize that certain days of the week are busier due to customer demand. You start to schedule based on that demand pattern.

Some industries have days of the week when companies don't want product delivered. One of my clients distributes food products to grocery stores. He knows that his three largest customers don't want deliveries on Wednesdays, so he uses that knowledge to run his business more efficiently. On Wednesdays, he delivers to other, smaller clients.

A learning-curve model compares *labor hours per unit* with production levels. After that, you consider *labor cost per unit*. It's similar to the cost estimate analyses described throughout this chapter. You look at an activity level and then review the cost per unit.

Assume you make a high-end office chairs. You train your production staff on how to assemble a new, more complex type of chair. Early on, your employees take more labor hours than planned to assemble the chairs. As time goes on, they start to understand the process and they work faster. Your labor hours go down — and so do your labor costs.

As your workers learn how to make the chairs, your labor cost per unit decreases. Your labor cost per unit for the first chair is a lot higher than the labor cost for the 500th chair. If you average the labor cost for units 1 through 500, the average cost is less than unit number 1's cost.

The cost function changes as you produce more product. Because the cost function isn't a straight line, it's a nonlinear cost function.

## Chapter 11

# Making Smart Business Decisions with Relevant Information

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### *In This Chapter*

- ▶ Understanding relevance in making decisions
  - ▶ Distinguishing between relevant and irrelevant information
  - ▶ Thinking about opportunity costs
  - ▶ Taking on special orders
  - ▶ Finding the optimal product mix
- 

**A** business owner makes decisions every day, some with far-reaching consequences. This chapter describes the decision model, the use of relevant information, and some choices that business owners may face.

In business, making a decision usually means cutting off one option and going with another. (Serendipitously, the word *decision* comes from the Latin word *decidere*, and it literally means “to cut off.”)

In cost accounting, *relevance* means “connected to the matter at hand” (as it also does in real life). It’s critical to focus on the most important data.

Your job is to define problems and determine which information (accounts, activities, costs) is most important. Then you decide what to do.

In this chapter, you see how to determine relevant costs and make decisions in an orderly way. You also look at special orders, opportunity costs, outsourcing, and capacity costs because they each have a big impact on your company’s profit. Use this chapter to make smart decisions about your most critical business decisions.

## Navigating the Geography of Relevance

*Relevant costs* and *relevant revenue* have an impact on your profit. You should pay the most attention to these numbers. Get these numbers “right,” and you can be more profitable. You get numbers right by analyzing relevant costs and relevant revenue, using what’s called a decision model.

In cost accounting, *relevant* means that you consider *future* revenue and expenses. Also, *relevant* means that a cost or revenue will change, depending on a decision you make. Past costs are water under the bridge, and if the costs or revenue remain the same no matter what you decide, they aren’t relevant.



A relevant amount is not necessarily a *material* amount. If you were closing a factory, the cost you pay for trash removal at the factory location would be relevant. If the factory stays open, you pay for trash removal. If you close the factory, you no longer pay for the service. So your decision determines whether or not you have the trash removal cost.

While the trash removal cost is relevant, it may not be material. Materiality refers to the *dollar amount* of the cost. Most accountants determine a minimum dollar amount for materiality. Amounts below the minimum are ignored. If the relevant decisions for the plant closing total \$1,000,000, a \$600 decision about trash pickup may not be material.

It helps to define a term by explaining what it isn’t. A relevant cost isn’t a past or sunk cost. (Take a look at Chapter 3, if you need a refresher.) Sunk costs are done deals and are irrelevant moving forward. They’re already paid, and you can’t change them.

Say you make the lease payment on your factory on the first day of the month. Later, on the 15th, you make a decision about which product to produce for the rest of the month. Your lease payment is *important* (of course), but it’s not *relevant* to the production decision. That’s because the lease payment can’t be changed for the remainder of the month.

## Introducing the decision model

As you sort through and determine what’s relevant to a decision, you can move on to using a great tool: the decision model. A *decision model* is a process for making important decisions. Most types of organizations (businesses, sports teams, and governments, to name a few) have a formal process for making choices. Some of this, of course, is common sense. Here are the steps in a typical decision model:

1. Define the problem.
2. Gather information.
3. Make assumptions about future costs. (This is called *forecasting*.)
4. Analyze alternatives, and select one.
5. Implement your decision.
6. Evaluate the outcome of your decision.

This process may seem obvious, but companies have to learn it. In fact, some companies hire consultants to come onsite to teach the principles.

### *Applying a model to an equipment decision*

Say you manufacture Supperware plastic containers — simple items for storing food. You identify a problem: A piece of machinery has become inefficient. The machine breaks down frequently and requires a lot of repair and maintenance. You decide to consider replacing the machine.

Using the decision model, you define a problem. Now gather more information.

#### *Determining alternatives*

Your current machine has a five-year remaining useful life. After that, it will have to be scrapped. You can use the machine for five more years, but there are two problems. First, the repair and maintenance expense is much higher on the current machine compared to a new one. Second, the old machine produces fewer items than a new one. Fewer items produced may mean less revenue.

Now forecast — that is, make assumptions about future costs. If you buy a new machine, you have to borrow funds for the purchase. Like any loan, you need to repay the principal (the amount borrowed) and interest. Those payments are part of the decision.

Analyze alternatives, and select one. You perform an analysis on two scenarios. In the first scenario, everything stays as is. In the second scenario, you buy a new machine. (That also means that you sell the old machine, but it's not worth much, because the technology is very old.)

Your analysis should include a comparison of the most expense and revenue data.

## Your how-to book: An operations manual

The largest decisions a company makes — whether to sell the company or merge with another company, for example — can't be easily explained in a manual. That decision is very complex. For everything else, there's the operations manual. An *operations manual* is an internal company document that explains how you operate your business. It's not shared with the outside world. All the major tasks you perform (manufacturing, product delivery, bill payment, hiring, purchasing decisions, and so forth) should be explained in the operations manual. The purpose of an operations manual is to educate

people in the company. I call it the "hit by a bus" document (not a very positive title, but it makes an impression!). If someone in your company leaves or retires (or is hit by a bus), another employee can pick up his or her work more quickly if the operations manual is up to date. When someone leaves your business, a certain amount of institutional knowledge goes out the door with him or her. Hopefully, a lot of that employee's company-specific knowledge is recorded in an operations manual. To ease the decision-making process, more companies have an operations manual.



### *Considering depreciation*

*Depreciation* is an expense. Depreciation expense accounts for the decline of an asset's value. The decline occurs as the asset is "used up." You calculate depreciation expense using the cost of the asset, its useful life, and its salvage value. *Salvage value* is the sales proceeds you receive if you choose to sell the asset at the end of its useful life. When you buy a new car, you get cash by trading in your old car. That's the salvage value. Actually, the dealer uses the trade-in "cash" to reduce the cost of the new vehicle. (I drive cars until the wheels fall off, so I don't usually get much on the trade-in.) Most important, depreciation expense doesn't use "real" cash — the expense is on your books, but you don't write a check each year as your car depreciates. The car is just worth less. By the way, there are many ways to calculate depreciation. Some methods have more expense in early years and less in later years. Other methods assume a fixed amount each year. What you see in Table 11-1 is called *five-year straight-line*.

Table 11-1 provides an analysis, comparing "keepin' on keepin' on" with the old machine for five years versus buying a new machine.

### *Coming to conclusions*

It might be surprising, but you're better off keeping the old machine for five years. Check out the bottom line of Table 11-1. The old machine's total is \$20,000 higher each year (\$125,000 versus \$105,000).

Sure, you would earn a lot more revenue from the new machine each year. In fact, you could take in \$100,000 more (\$260,000 versus \$160,000). However, you have to pay that \$100,000 annual tab for the loan. Because it's a new machine (and almost certainly more expensive to buy), your depreciation expense is also higher.

**Table 11-1 Machine Purchase Decision — Comparison**

<i>Annual Expense</i>	<i>Old Machine</i>	<i>New Machine</i>
New machine loan payments	N/A	-\$100,000
Proceeds from selling old machine	\$20,000	\$0
Depreciation expense	-\$30,000	-\$50,000
Repair and maintenance expense	-\$25,000	-\$5,000
<b>Subtotal: Annual expense</b>	<b>-\$35,000</b>	<b>-\$155,000</b>
<b>Annual production revenue</b>		
Units produced (A)	80,000	130,000
Revenue per unit (B)	\$2	\$2
<b>Annual revenue (A × B)</b>	<b>\$160,000</b>	<b>\$260,000</b>
Revenue less expense	\$125,000	\$105,000



To be fair to the new machine, the numbers for the old machine look good only in Year 5 (shown in Table 11-1), when you take in \$20,000 in salvage value. Ignore that, and both deals are even. Further, if production is trending up, the old machine will never keep pace, so you may want to seriously consider buying that new machine.

### *Connecting your decision to the balance sheet*

You just analyzed whether or not to replace a piece of machinery. Machinery is an asset, because it's something you use up to make money in your business. This is a good point to go over the concept of a balance sheet.

Don't jump to another chapter simply to review what a balance sheet is. I sing "The Balance Sheet Song" here and now, once more with feeling. The balance sheet formula is  $\text{equity} = \text{assets} - \text{liabilities}$ . A company's true value is equity. If you sold all of the assets and used the cash to pay off all the liabilities, the remaining cash balance is equity, the true worth of the business.

If you were deciding to buy, say, a restaurant, your analysis of relevant information would include a list of assets: furniture, fixtures, ovens, dishwashers, and the like. However, you'd also want to see the depreciation listing. Here's the skinny: You want to know the *real value* of the assets you're buying. That value is called *book value*, and it's defined as original cost less accumulated depreciation. *Accumulated depreciation* is the sum of all the depreciation of an asset since it was purchased.

If the current restaurant owner bought an oven for \$60,000 but has already recognized \$55,000 in accumulated depreciation, the book value is only \$5,000. That implies that the asset (the oven) needs to be replaced soon.

Book value cannot be seen as the replacement value. You typically can't replace a depreciated asset with a similar asset at the same price. Prices go up. Equipment models are discontinued. You will likely replace an old machine with a new, more expensive (and presumably better) model.

## *Considering relevant qualitative factors in decision-making*

*Qualitative factors* don't involve numbers and financial analysis. Call them "people" factors. Decisions based in part on qualitative factors are relevant, even though you can't tie specific cost or revenue numbers to them. They can have a long-term impact on profitability, so you need to consider them. Qualitative factors should always be considered before making any business decisions.

The qualitative factor that has the biggest impact on your business may be employee morale. It's really an issue when there's bad news, such as a layoff. Layoffs, as a rule, don't improve employee morale. Employees are uncertain about their futures, even if they've been told that their jobs are secure. They may be skeptical, saying, "Yeah, and if you believe that, I've got a bridge I want to sell you."

On top of that, the remaining employees may have to take on the workload of people who were let go. The worst thing you can say to them is, "Work smarter, not harder." Trust me, employees have a BS meter that's always operating, and that statement is a 9.9 on a scale of 10.

There's a rule that's true far more often than not: When employee morale goes down, productivity goes down, too.



When companies reduce the workforce, the goal is, obviously, to reduce costs. Say a firm has 100 employees and cuts the staff to 80 people. You'd think profits would go up. After all, the company cut the cost (salary and benefits) of 20 people. The problem occurs with the 80 people who remain. Productivity (how much they get done) suffers, at least in the short term. Also, most people have an emotional reaction to the layoff. That emotion lingers and affects productivity.

There's another, bigger potential problem with layoffs: When you lay people off, some institutional knowledge leaves with them. Even the best operations manual can't cover everything. If a company lays off a great sales representative, personal relationships with customers may suffer, too. When other key people leave, those taking up their duties will make mistakes — that's almost unavoidable. Those mistakes can cost the company business, if the company isn't careful. In extreme situations, lost business (due to mistakes) costs more than the cost savings from the layoff.

You may not be able to *trace* the impact of a qualitative factor such as layoff effects to product costs, but you can *allocate* it. Doing so adds more lines to your decision-making analysis. It also requires you to make judicious estimates. For example, you might say, "I'm going to assume a 10 percent drop in productivity for three months."



If you happen to employ one of the most creative people of the 21st century, try not to lay him off. You might lose money. Link these two sentences together: "After losing a power struggle with the board of directors in 1985, Steve Jobs left Apple." "On July 9, 1997, Gil Amelio was ousted by the board of directors *after overseeing a three-year record-low stock price and crippling financial losses*. Jobs became the interim CEO and began restructuring the company's product line." Over 12 years, Apple got into trouble. When Jobs returned, he introduced the iPod, iPhone, and iPad — and incidentally caused Apple to have *more cash in the bank than all corporations and most of the nations of the world*.

The remainder of the decision-making process is simple but requires some detail work. First, implement your decision. Then evaluate the outcome of your decision. The results will tell you if you decided wisely. If you've made a mistake, you must make new decisions about how to fix it.

## ***Special Orders Don't Upset Us, Do They?***

You might remember the commercial jingle "Hold the pickles, hold the lettuce, special orders don't upset us." (I do, but then again, I remember having only five TV channels when I was in grade school.) A *special order* is a one-time customer order, often involving a large quantity and a low price. Hey! This is a chance to make money or lose money. Tough choice.

A special order requires you to make decisions using relevant information. You decide which costs and revenue are relevant. Based on your analysis, you make a decision designed to maximize your profit.

Keep the following points in mind when you're considering special orders:

- ✔ Because you are already in business to produce other goods, assume that your fixed costs are being paid for from your regular production. Assume that you've received other orders, completed work, and billed clients. That revenue allows you to cover fixed costs — like a building lease payment or insurance premiums.
- ✔ A special order can be filled only if you have excess capacity (see Chapter 9). You must have the ability to perform the work.
- ✔ Get ready for this: You can accept a *lower* sales price for a special order and still be profitable. Huh? Really, it's true. As you see in this section, fixed costs aren't relevant. The fixed costs have already been paid for with earlier production. They are past (sunk) costs, so you do not need to worry about covering them with your special-order revenue.
- ✔ Variable costs *are* a part of your special-order calculation. Variable costs are almost always relevant to a special order.

Say your company manufactures bath towels. Table 11-2 shows your results before you're approached about a special order.

<i>Units Produced: 300,000</i>	<i>Per Unit</i>	<i>Total</i>
Sales (revenue)	\$12	\$3,600,000
Fixed cost		-\$1,000,000
Variable cost	\$7	-\$2,100,000
<b>Profit</b>		<b>\$500,000</b>

A customer wants to place an order for 50,000 towels. The customer is willing to pay only \$8 per towel. Assuming you have excess capacity, would it be profitable to accept the order? Check out Table 11-3.

<i>Units Produced: 50,000</i>	<i>Per Unit</i>	<i>Total</i>
Sales (revenue)	\$8	\$400,000
Fixed cost		\$0
Variable cost	\$7	350,000
<b>Profit</b>		<b>\$50,000</b>

Actually, the order *is* profitable. Because fixed costs were covered by your other production, there's no fixed cost related to this order. The variable costs per unit are the same (\$7). At \$8 per towel, the order generates a \$50,000 profit. Think of anything above \$7 as icing on the cake, because this is a sale that would not normally be part of your regular income stream.

Again, this order is a one-time deal. The 50,000 units in Table 11-3 aren't part of your normal production. Units in normal production incur fixed costs, and fixed costs are excluded from the special order. An \$8 per-unit price wouldn't cover the *full cost* of the product in normal production. You exclude fixed costs from your special order because they're already covered by your regular sales; however, an \$8 unit price wouldn't cover the full cost of the product in normal production.



Always think of fixed costs in total dollars. Although it's good to also look at fixed costs on a per-unit basis, per-unit fixed costs can be misleading and lead to mistakes in analysis. Why? Because fixed cost per unit is always changing, depending on how many units you produce. Always consider the *total* costs.

The goal is to generate enough revenue to cover (pay for) the entire dollar amount of fixed costs. That concept is in the definition of contribution margin (see Chapter 3). Contribution margin pays for fixed costs. Whatever's left over is profit.

You show a total dollar amount in your analysis because you're trying to cover a dollar amount of costs. In Table 11-2, you see fixed costs in dollars. The per-unit column is blank.

Certainly, you can analyze *variable* cost on a per-unit basis. That makes sense. You *trace* materials and labor to a unit. Fixed costs, on the other hand, normally are *allocated* as an indirect cost. Stick with the total fixed cost in dollars.

## Deciding between Outsourcing and In-house Production

*Outsourcing* is defined as purchasing a good or service from an outside vendor rather than producing the good or service in-house (within your company). It's also referred to as a *make versus buy decision*.

A decision to outsource certainly considers reducing costs as a goal. If you can get the same (or virtually the same) product or service for less than it costs in-house, why not? So part of your analysis is reviewing costs, and you focus on relevant costs.

There's more to your outsourcing decision than just costs. You also must consider what you'll be giving up by losing some control over the goods and services. Think about the quality. Assume you create quality items with few flaws. Is the outsourced item just as good?

Anything you outsource should be delivered on time, just as it is when you make a product in-house. That means that the company you hire will need enough time, staff, and capacity to give you timely delivery.

The company taking over the process should also maintain confidentiality.

Look at two tables you can use to make an outsourcing decision. Table 11-4 is the "make" decision table. It shows the cost to continue making a product in-house. The product is towels (from an earlier example). Table 11-5 is the "buy" decision table. It assumes a purchase price from a supplier. The supplier will make the towels. You'll then add some finishing stitching and your company label. At that point, the towels will be ready for sale.

<b>Table 11-4 "Make" Decision – Continue Production</b>		
<i>Units Produced: 40,000</i>	<i>Per Unit</i>	<i>Total</i>
<b>Variable costs</b>		
Direct material	\$2.00	\$80,000
Direct labor	\$1.00	\$40,000
Variable factory overhead	\$0.50	\$20,000
Shipping and handling	\$0.25	\$10,000
Sale commissions	\$1.00	\$40,000
<b>Total variable costs</b>	<b>\$4.75</b>	<b>\$190,000</b>
Fixed costs, salary and benefits		\$60,000
Other fixed overhead		\$100,000
<b>Total fixed costs</b>		<b>\$160,000</b>
<b>Total costs</b>		<b>\$350,000</b>

You've seen some of the stuff in Table 11-4. Variable costs (material, labor, overhead) are described in Chapter 4. You also see shipping, handling, and sales commissions. These are costs to make the product, package and ship it, and sell it (sales commissions).

Your company incurs *other fixed overhead*, including depreciation in building and equipment, insurance premiums, and office costs. Finally, you incur \$60,000 in fixed salary and benefits for a production manager, whose sole role is to manage your towel production during the year. The variable labor costs are for production workers. These employees are paid on an hourly

basis, and their time is directly related to a unit of product. It's a direct cost and a separate expense from the production manager. The production manager's time can't be traced to an individual unit of product and is fixed.

So Table 11-4 is where you stand if you continue to produce the towels yourself. Then something interesting happens: A supplier offers to produce towels for you. Use the supplier's information to create Table 11-5.

<i>Units Produced: 40,000</i>	<i>Per Unit</i>	<i>Total</i>
<b>Variable costs</b>		
Direct material	\$0	\$0
Direct labor	\$0	\$0
Variable factory overhead	\$0	\$0
Purchase cost of towels – supplier	\$3.80	\$152,000
Shipping and handling	\$0.25	\$10,000
Sales commissions	\$1.00	\$40,000
<b>Total variable costs</b>	<b>\$5.05</b>	<b>\$202,000</b>
<b>Fixed costs, salary and benefits</b>		
Other fixed overhead		\$100,000
<b>Total fixed costs</b>		<b>\$100,000</b>
<b>Total costs</b>		<b>\$302,000</b>

Say what? You save \$48,000 (\$350,000 versus \$302,000 cost) by outsourcing. As you scan down Table 11-5 from top to bottom, here's what you find:

- ✔ Production-related variable costs (materials, labor, and overhead) are eliminated. In their place, you see "Purchase cost of towels – supplier." That's what the supplier charges to produce the product.
- ✔ Distribution costs (shipping, handling, and sales commissions) don't change. Your company will still perform those tasks and incur the costs.
- ✔ Other fixed overhead costs (depreciation, insurance premiums, and so forth) remain. Important point: When you consider outsourcing, some fixed costs *cannot be eliminated*. And that's the fact, Jack. By definition, they're fixed, and your company must continue to pay them.
- ✔ There's one final cost you can eliminate. Outsourcing assumes that you no longer produce the product. That means you don't need the production-manager position. That \$60,000 fixed salary and benefit cost is eliminated. Because the outsourcing cost total is less than keeping production in-house, you should outsource.

Tables 11-4 and 11-5 show both relevant and irrelevant costs. You made your decision based on relevant costs — those that changed. Eliminating the variable production cost and the production-manager position saved money. The tables include all costs, so you can envision the entire process.



If you want to be able to live with yourself — and in your community — be very careful of creating a negative externality. In economics, an *externality* is a cost or benefit that isn't transmitted by prices. A *negative externality* is a cost that the creator of a problem (you) doesn't bear. "Nobody" pays for it, except that everyone pays for it. You could call it "playing for free." For example, if you lay off the production manager, he may go on food stamps, which everyone pays for. He may not be able to pay property taxes, which pays for the area schools. Further, the outsourcing company may not pay a living wage or health benefits. It may hire illegal workers. Does the deal seem so good now?

It may be that your best financial decision is to produce *at a loss*. On the surface, that sounds like a bad decision, but it might make sense if it allows you to pay for a fixed cost that you can't eliminate easily. Assume you're committed to make payment on a building lease. You signed a contract, which runs for two more years. You use the building for production. Your analysis indicates that you'll lose money if you keep producing. However, if you stop producing, you still have to pay that pesky lease payment. (You may want to use a stronger word than *pesky*.)

You have a choice. You can shut down production and lose the revenue — and *still* have to pay on the lease, or you produce at a loss. At the least, that generates some revenue to pay the lease. If the loss on production is less than the lease payment, keep producing. You'll lose less money.

Now, no one wants to tell people, "Business is great! I'm losing less money!" However, it may be the right decision. It allows you to cover at least some of the fixed cost. It's a short-term solution until you can get out of the fixed cost commitment. At that point, you can shut down production altogether.

## *Weighing opportunity costs*

*Opportunity cost* is what you give up by making a decision to go in one direction rather than another.

Opportunity costs occur because all businesses have limited resources. For example, you only have so many machine hours you can use to produce goods. At some point, you have to decide how to use those hours to maximize profit. When you decide to concentrate on one product, you give up the chance to concentrate on another one, and that's an opportunity cost.

Table 11-6 shows an example of opportunity costs in a decision to outsource. Say you're losing money on a product, so you consider outsourcing it. On the left, you have the results of closing a company division. On the right, you see where you stand after the division is closed.

<b>Table 11-6</b>	<b>Closing a Division — Financial Impact</b>	
	<i>Before Closing</i>	<i>After Closing</i>
Sales (revenue)	\$1,000,000	-\$1,000,000
Less variable cost	-\$550,000	\$550,000
Equals contribution margin	\$450,000	-\$450,000
Less fixed cost	-\$480,000	\$370,000
<b>Loss</b>	<b>-\$30,000</b>	<b>-\$80,000</b>

The After Closing column is a little tricky. Here's an explanation: When you close the division, you lose \$1,000,000 in sales (a negative). You also gain (by not spending) \$550,000 in variable costs. The net result is that your contribution margin goes down by \$450,000.

You also save the money you were spending on fixed costs; however, only \$370,000 is added back in the right column. Just as in Table 11-5, not all of your fixed costs are eliminated. It makes sense, as many fixed costs (such as the building lease) are set up by contract. As long as the contract is in force, the company incurs the cost.

In the case presented in Table 11-6, you're *worse off* if you close the division. In fact, you lose \$50,000 more than if you keep the division open (losing \$80,000 versus losing \$30,000).

The information in Table 11-6 suggests what to do: Keep operating until those fixed costs can be covered by another division or until the commitment to pay those costs ends. If the loss from the division staying open (\$30,000) is less than the loss from the division closing (\$80,000), keep operating. And who knows? You might be able to turn things around and make the division profitable.

## *Contemplating the carrying cost of inventory*

Inventory can be a big cost in your business, and inventory issues may be a factor in a decision to outsource. If your company carries inventory, you have to consider the carrying cost of inventory. (See Chapter 4 if you need a review of inventory and the flow of manufacturing costs.)

In this section, you are a retailer who is buying inventory. In previous sections of this chapter, you looked at your costs from the point of view of a manufacturer. Now you're a retailer.

*Carrying cost of inventory* is the cost to hold and store your inventory. Carrying cost is also an opportunity cost. As a retailer, when you choose to purchase inventory, you're using an asset (cash) to buy inventory. Cash is an asset you could use for some other purpose. If you're a manufacturer, finished goods inventory represents "dead money" (stored cash). It's no good until you sell it.

Here are the primary factors to consider for carrying costs:

- ✔ **Interest cost:** Interest you pay on dollars borrowed to buy inventory. This factor can be stated another way. If you didn't have to borrow money to buy inventory, interest cost represents money you could have spent elsewhere or the interest you could have *earned* if you had invested the funds.
- ✔ **Ordering cost:** The cost charged by your supplier for each inventory purchase.
- ✔ **Quantity discount:** The percentage (or dollar amount) of discount you receive when you place a larger order for inventory.

Say you're the purchasing manager for a national chain of gift shops called Cuddly Puppies. You sell a line of scented candles that retail for \$10. The candles normally cost you \$5 each. Your supplier has called you to explain a new quantity discount program. If you purchase more candles in each order, you receive a discount on each candle. You're mulling over a decision: Should you take advantage of the discount and buy more candles? Table 11-7 lists the information.

	<i>Planned Buying</i>	<i>Discount Plan</i>
Orders placed annually (A)	50	30
Candles per order (B)	2,000	3,400
Total candles (A) × (B)	100,000	102,000
Cost per candle	\$5	\$4.60
<b>Total cost</b>	<b>\$500,000</b>	<b>\$469,200</b>

Ordering candles at a lower price reduces total cost. Now consider the carrying cost factors, mainly the effect on cash. Assume that you can warehouse 3,400 candles just as easily as 2,000 candles.

Fortunately, your company has plenty of cash to operate. In fact, you're able to invest extra cash. (Extra cash — a great problem to have!) You currently earn 5 percent annually on the cash.

Consider the cash you would save. The quantity discount proposal (discount plan) would allow you to invest another \$30,800 cash (\$500,000 – \$469,200). At a 5 percent annual rate, you'd increase your earnings on investing extra cash by \$1,540 (\$30,800 × 5 percent).

Ordering cost is \$150 per order. Your total orders placed would decline from 50 per year to 30 per year — 20 fewer orders. Therefore, ordering costs would go down by \$3,000 (\$150 × 20 orders).

Consider the quantity discount. You will save \$.40 per candle. Now, to make an apples-to-apples comparison, look at the first 2,000 candles you plan to buy. You save \$800 (\$0.40 savings per candle × 2,000 candles).

Here's the financial result, if you use quantity discount:

Total savings = interest earnings + ordering cost savings + price savings

Total savings = \$1,540 + \$3,000 + \$800

Total savings = \$5,340

Happy days are here again! You should take advantage of the quantity discount. But before you pick up the phone to call your supplier, consider one more issue.

Think about how long it takes to sell the 2,000 extra candles that you buy over a year. Because you were already buying 100,000 candles a year (2,000 a week for about 50 weeks), and the new quantity is 102,000, you're essentially buying an extra week's worth of inventory. Not a big deal — go ahead and take the quantity discount. The total amount ordered is only 2 percent more than you were purchasing before. You will probably be able to make these extra sales.

## *Maximizing Profit When Capacity Is Limited*

When capacity is limited (and it always is), you have to make decisions. (See Chapter 9 for more about capacity levels.) In this section, you see how to make choices between two products when capacity is limited. Your goal is to combine the production of two products in such a way as to maximize profit.

You look at relevant costs and relevant revenue at the customer level.

### *Managing capacity and product mix*

*Product mix* refers to the mix of products you produce. *Sales mix* refers to the mix of products you sell. They are broadly related. Every company deals with limited capacity, so smart decisions about product mix can greatly increase your profit. (And I hate to say it, but dumb decisions about product mix can greatly decrease your profit.) You just need to work out the most profitable product mix you can.

Say you produce furniture. The market you sell in is very competitive, so your profit margin (profit as a percentage of sales) is small. One step in your production process requires work to be performed by hand. The work is complex, and you don't have many people on your staff who can do it. Your capacity (labor hours) is limited, so you need to make sure that every hour worked is as profitable as it can be.

You need to allocate your production between two products: the Mellow Yellow chair and the Norwegian Wood chair. The challenge is that each product requires a different number of labor hours. Also, each product has a different contribution margin per unit. Recall that contribution margin equals sales less variable costs. You need to decide on the best mix.

To compare the two products, use contribution margin per hour. Table 11-8 lists the two products and the contribution margin per hour for each.

**Table 11-8 Product Mix — Contribution Margin Per Hour**

<i>Product Contribution Margin Per Unit</i>	<i>Hours Per Unit</i>	<i>Contribution Margin Per Hour</i>
Mellow Yellow chair (\$50 per unit)	2 hours	\$25 per unit
Norwegian Wood chair (\$57 per unit)	3 hours	\$19 per unit

The Mellow Yellow chair has a higher contribution margin per hour. You should use your available capacity (labor hours) to produce as many Mellow Yellow chairs as needed. In other words, try to fill all of the Mellow Yellow orders, if possible. If there are hours left, use them to produce the Norwegian Wood chair.

Assume you have orders for 6,500 Mellow Yellow chairs. You have orders for 9,000 Norwegian Wood chairs. Now what? Table 11-9 details how production would look.

**Table 11-9 Product Mix — Actual Production**

<b>Total Labor Hours Available</b>	<b>31,000</b>
Mellow Yellow chairs	
Customer orders (units)	6,500
Labor hours per unit	2
Mellow Yellow hours used	-13,000
<b>Remaining labor hours</b>	<b>18,000</b>
Norwegian Wood chairs	
Customer orders (units)	6,000
Labor hours per unit	3
Norwegian Wood hours used	-18,000
<b>Remaining labor hours</b>	<b>0</b>

There's a two-step process in Table 11-9. First, you "max out" the Mellow Yellow chair production. You produce 6,500 chairs, and at 2 labor hours per unit, you use up 13,000 labor hours. That leaves 18,000 hours for Norwegian Wood chair production.

You couldn't fill all of the Norwegian Wood chair orders. There were orders for 9,000 chairs, but you had only enough labor hours left to produce 6,000 chairs (6,000 orders  $\times$  3 labor hours per chair).

You made the right decision. After you determined the best use of your labor hour time, you produced the product that created the bigger contribution to profit (contribution margin) first.



Business can be bizarre. Consider that you've limited production of the Norwegian Wood chair because compared with the Mellow Yellow chair, there's less profit in this item. In the minds of the retailers and customers, Norwegian Wood chairs are now back-ordered, because the manufacturer (you) just can't keep up with demand. Customers may perceive the Norwegian Wood chair as highly desirable and hard to get. Your limited production may have *increased* customer interest. (At some point, you might increase capacity or *raise prices*. The customers may eat it up. Then you'll be eager to do these calculations again.)

## ***Analyzing customer profit and capacity***

One more time, a cost object is anything (a product line, a unit, or a batch) that's used to accumulate costs. A *customer* can also be a cost object. This section looks at costs and profit per customer. That perspective helps you make good decisions about your limited capacity and customer profit.

Technology allows companies to analyze data for many customers. Computer programs can easily separate and review lots of customer data on costs and profits.

Small companies may not have the technology for complex analysis. If that's the case, customer analysis applies best to companies with a limited number of customers or those who have excellent homogeneous customer data.

### ***Job costing versus process costing***

Job costing collects data and analyzing costs by the job. It assumes that each job has a different combination of costs. Process costing assumes that each product is similar. In that case, you analyze costs by *process*, not by job.

With job costing, you see some customers who are more profitable than others, and that's what you're looking for. Job costing makes it easier to see key information. For example, the most expensive job — or the job that you didn't estimate accurately — becomes obvious. Just review your job cost sheets.

## The ideal customer

Smart companies know who their *ideal customer* is. That's the customer who wants the product and is willing to pay a price that makes the transaction profitable. After the company figures out who its ideal customer is, it plans marketing, production, and pricing.

Say you sell mountain bikes. You've sold them for a while, and you've paid attention to your customers. You notice that the people who most often buy the bikes live in the Mountain West of the United States. The majority of your buyers are professionals in their 30s and 40s. They use the bikes on weekends for recreation. A smaller

percentage of your business is younger people who ride the bikes to school and work.

Your ideal customer is the professional who rides on weekends. He (more likely a male) is willing to pay \$2,400 for that little titanium-framed number in your product line. So you plan your marketing to target that group — male professionals who are weekend warriors. You price your product at a level you know they're willing to pay (probably a higher price than a younger person would pay). That's how you use your ideal customer profile to generate profit.

A large amount of indirect costs can create problems. Indirect costs are allocated rather than traced to the product. As you've seen several times so far, you need good customer data to properly allocate costs. If you don't have good numbers, you won't allocate costs accurately. This issue affects both job costing and process costing.

The point is simply that different customers have different levels of profitability.

Because you have limited capacity, you want to *do more business with the most profitable clients* and less business with the others. So come up with some criteria to decide which clients are the ones you *really* want. You already know in your heart (or gut) that it's true, and you just need to quantify it. Your most profitable clients are those that match the criteria you create.

### ***Relevant cost and revenue***

Connect the relevant cost and relevant revenue to the capacity planning. After all, capacity is limited. *Relevant*, of course, refers to the cost and revenue that makes a difference when you make decisions.

A friend of mine used to be a pastry chef. She created and delivered specialty desserts to local restaurants and had seven restaurants as clients. The type of product isn't relevant because each client got the same selection of desserts, but in varying quantities. (By the way, it's always great to go to her house for dinner, because the cooking is better than in any restaurant!)

With only seven restaurants, it's relatively easy to separate data about each one. If the products are identical for each client, there must be other cost and sale factors that could determine which clients are more profitable.

Research pays off. It turns out that five clients consistently placed their dessert orders a week in advance. This gave the chef time to plan ingredient purchases and production. She had two large commercial ovens at home, which allowed her to bake a large number of items at a time. Her production time was baking time, and normal production was a smooth process.

During her review, she noticed that two clients, the Blue Heron and the Lakeside Café, didn't give her as much notice. On average, they placed orders just three days in advance. As a result, she had to scramble. Her purchasing and production had to be changed.

There's a financial impact, and it's relevant. The chef had to buy additional ingredients (such as flour, milk, eggs, sugar, and specialty food items) at the last minute — all the time.

Also, she had to buy less than her normal amounts. And she had to make extra trips back to her suppliers to buy for the two late-ordering customers. The chef paid relatively more for smaller amounts of ingredients, and her driving cost was the same as for a normal buy.

She should have passed those higher costs on to the Blue Heron and the Lakeside Café. Being a diplomat, she would have explained the situation to them. Before she sent any invoice with higher prices, she should have explained that ingredient costs were higher because they ordered later than other clients. "If you order a week in advance, the product cost will be lower, Mr. Customer!" Maybe this explanation would have changed the client's behavior.

What type of restaurant would be the ideal new customer? One that orders one week in advance. Her policy would be to be clear up front about ordering, maybe saying, "If you can't do that, Ms. New Customer, I charge a 5 percent fee. I run up more costs by ordering materials later than planned. I'm sure you can understand that." If I heard that, it would sound perfectly reasonable to me.

If you know of customer behaviors that increase your costs, you can do something about it! You can actually coach or train your clients, so you don't have to pass on the additional cost to them. They can change their behavior and get a better price.

Managing a business requires you to make decisions. In fact, you are making a business decision when you choose to do nothing. As you gather and analyze data, focus on your relevant costs and revenue. Relevant costs and revenue will be different, depending on the decision that you make. When you consider relevant information, you can make a well-informed business decision.

## Chapter 12

# Making Smart Pricing Decisions: Figuring Total Costs

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### *In This Chapter*

- ▶ Understanding the impact of pricing on customer decisions
  - ▶ Reviewing issues with special orders
  - ▶ Thinking about short-term and long-term pricing issues
  - ▶ Covering the concept of target costing
  - ▶ Deciding which costs add value
- 

**T**urn to any chapter in this book, and you'll find topics about analyzing costs to reduce or eliminate them. Now, a logical next step is to use your total costs to price your product for a reasonable profit. Enter the fascinating world of pricing.

*Managers make pricing decisions.* They decide what to charge for their products or services. These decisions determine what and how much to produce. Ultimately, production decisions then determine spending.

In this chapter, you see how prices affect the buying habits of your customers (an inconvenient truth). This chapter defines *product costing* and *target costing*. You analyze whether a given cost adds value or if the cost flat-out isn't needed. The goal is that you come away with a better understanding of how to price your products or services.

## *Understanding Influences on Prices*

As you consider a price for your product, keep in mind how outside influences impact the price. Suppliers affect the cost of your product based on the rate they charge you for materials or component parts. If you set your price too high, clients might consider buying from one of your competitors. A customer may not buy the product at all (from you or anyone else) if they consider the price to be a lot higher than the product's value. This section discusses influences on your product's price.

## Customers

The old saying goes “The customer is always right.” (Actually, the *real* saying is, “The customer may not always be right, but he or she is *always* the customer.”) Think of it another way: Treat the customer with respect. When it comes to pricing, deal with customers fairly. If you don’t, they’ll leave you and take their business elsewhere.

Technology allows smart customers to do their homework. If customers feel they aren’t being treated fairly, they’re be on the Internet in an instant, and they can find someone else who can offer the same product or service. Constantly improving technology is the great equalizer. Everyone has access to the same basic information about products and price.

## Competitors

Customers are an influence in your pricing decisions. You have other influences that affect price, too.

Competitors are likely to offer products that compete directly with your products (which is why they’re called competitors). It can hurt when a competitor cuts prices or improves product design, and you need to decide how to respond. You might cut your prices. Maybe you can innovate an improved product and keep your price the same. It’s okay; you can analyze the costs you incur for each of your options and make a decision.

Customer can use technology to compare products as easily as they compare prices. If your competitor makes changes, and you don’t respond in some way, you can expect to lose business quickly.



Every business has (or should have) a website. It’s true for both retailers and commodity suppliers. Smart customers research their purchases. In fact, they even research where to get the best, cheapest, and fastest lunchtime burger. When you go out for lunch, if your local sandwich shop tells you it doesn’t need a website, it’s a safe bet that it’s losing business to a shop that has a site.

## Suppliers

A reliable supplier can have an excellent impact on your prices. Consider the supplier that ships you a quality product and does it quickly. You have a dependable pipeline for supplies (retail goods or manufacturing material, for example). If you know what you’re getting and when you’re getting it, you can confidently build supply costs into your product’s price.

## Special orders

Whether or not a customer order is a special order could have a big influence on the price you charge. That's because generally speaking, your costs are different for a special order compared with orders you normally take from customers.

A special order assumes you have *excess capacity* — production capacity you're not currently using. The concept also assumes that all fixed costs have already been paid through regular production. As a result, fixed costs are irrelevant and aren't part of the decision to take on a special order. (Take a look at Chapter 11 for a review.)

You may be willing to accept a lower sale price for a special order because you have fewer costs to cover; however, there are some additional variables for special orders. There are cases where you actually may need to cover some of your fixed costs for a special order. In some cases, the special order may create *more* fixed costs.

Finally, your special-order sales price may be driven by a competitor's market price. You might have to keep your sale price low to beat a competitor's price.

Say you make baseball gloves. Table 12-1 shows your sale price, cost, and profit for regular production.

**Table 12-1 Baseball Glove Company — Before Special Order**

<i>Units Produced: 300,000</i>	<i>Per Unit</i>	<i>Total</i>
Sales (revenue)	\$90	\$27,000,000
Less:		
Fixed cost		-\$3,000,000
Variable cost	\$70	-\$21,000,000
<b>Profit</b>		<b>\$3,000,000</b>

A client contacts you with a special-order proposal. He's willing to pay \$74 per glove for 100,000 gloves, but the special-order glove requires some setup costs. You have to make changes to equipment to manufacture the new glove. You also need to load a different chemical in your machinery to spray waterproofing material on each glove.

The additional fixed costs for the special order total \$300,000, and you consider these costs a one-time fixed cost for this special order. Your other fixed costs have already been paid, so they are irrelevant. The variable costs remain. You incur material and labor costs for any good you produce — that's always true for normal production or a special order. Table 12-2 shows your sale price, cost, and profit for the special order.

<i>Units Produced: 100,000</i>	<i>Per Unit</i>	<i>Total</i>
Sales (revenue)	\$74	\$7,400,000
Less:		
Fixed cost		-\$300,000
Variable cost	\$70	-\$7,000,000
<b>Profit</b>		<b>\$100,000</b>

The special order is profitable, so you should accept it. The profit is only \$1 per glove (\$100,000 profit ÷ 100,000 gloves). That's not nearly as good as the profit from regular production (\$10 per glove), but money is money, and it's a darned sight better than letting your equipment sit idle.

But say the client isn't 100 percent satisfied with a price of \$74, the price they *said* they were willing to pay. Get ready: You're about to be low-balled. The client tells you he has a bid from a competitor to make the gloves for \$72.50 each.

Don't touch this one. The order isn't profitable at \$72.50. Take a look at this calculation:

$$\text{Profit} = \text{sales} - \text{fixed costs} - \text{variable costs}$$

$$\text{Profit} = \$7,250,000 - \$300,000 - \$7,000,000$$

$$\text{Profit} = -\$50,000$$

Your "profit" is a \$50,000 loss!

## *Pricing for Profits Down the Road*

A special-order decision is a short-term decision. The excess capacity exists only short-term, so shift your thinking, and consider long-run pricing decisions. Think about those clients who place orders every month (hopefully with your company), and you get into a whole different set of pricing considerations. As it turns out, long-term decisions may be more important.

### *Reviewing market-based and cost-based pricing*

*Market-based pricing* sets the product price based on customer expectations and demand. You take a look at the customer's perceived value of the product. Based on the customer view, you estimate how much he or she would be willing to pay.

Companies that face high levels of competition use market-based pricing. Customers may not see much difference between your product and that of your competitors. Say you sell lawn mowers. You compete with similar products that are all priced around \$300. If you price your product at \$350, a customer may not see any difference between you and the competition. The customer buys a lawn mower priced at \$300 from somebody else.

With market-based pricing, you start at the top — with the price. After you nail down a price, you then look at costs. You compare price less costs to see if the profit is reasonable. There's pressure not to raise your price; the only way to increase profit is to cut costs.

*Cost-based pricing* assumes that you can differentiate your product from your competitors. Think about the latest technology gadget. A certain number of people want to have a new device right after it's launched, and they're willing to pay quite a bit for that privilege. Those customers perceive a high level of product value, even if the value is only in its being The Next New Thing. In high tech, the mantra is "Time to market is *everything*." When the customer buys a hot product from a competitor, you won't be selling to that customer.

Using cost-based pricing, you look at costs first. You then consider how high a price you can charge, based on your estimate of customer demand. This pricing method allows you to start at the bottom (costs) and work your way up to a price. You set that price as high as you reasonably can to maximize your profit.

## *Aiming at the target: Target costing*

*Target costing* is a two-step process to determine the cost of your product. First, you estimate a target price — an estimated price you think your customer is willing to pay based on market conditions. You use the target price information to compute the target cost. You consider

- ✓ Customer perception of the value of your product
- ✓ Customer perception of your product compared with your competitors'
- ✓ Your ability to differentiate your product from the competition

The first point is about the customer's perception of your product. You can find what it is by *asking*. Talk to your customers; that's the easiest and perhaps the soundest method (and you'd be surprised by how many small businesses never ask). If you have a sales force, your sales reps can ask your customers about everything from perceived quality to perceived speed of delivery. Formally, you could conduct surveys and focus groups.

The second point considers how your customers compare you to the competition. Again, just ask and thou shalt receive. People *love* to be asked. You also might consider paying a firm to perform market research for you. The cost of hiring the firm may be worth the specific customer information it can provide. The more you know about your customers, the better you can serve their needs.

The third point is about differentiation in products. There are numerous ways to see the differences. You can always simply buy a copy of the competitor's product, but there's more. See the discussion of reverse engineering later in this chapter.

### *It's elementary, Dr. Watson: Gathering information from many sources*

If you're willing to play detective, there are several great ways to learn about your competitors. The more you know, the better. You may start off just learning about the competition's product, but when you're done, you'll know a lot about the competitor's business processes and philosophy. That knowledge can make a big difference. The result is that you end up with information to make more accurate comparisons between your product and that of the competition.

You can get competitor information from customers, suppliers, and public information. There are less savory techniques (and you better believe that low-integrity businesses have used them), but we won't go there.

- ✓ **Your customers:** Ask your customers if they have done business with your competition. Find out about their whole buying experience: the price they paid, how they were treated, the service they received. That's great information, and they are likely to be willing to share.

- ✔ **Suppliers:** A supplier might be tougher, but it's still worth a try. Suppliers may keep information on *current* clients confidential, but you might be able to get some data on a competitor who is a *former* client. A supplier can tell you what your competitor bought, how much, and possibly for what price, and maybe why the competitor stopped buying from them. Essentially, you're getting data on your competitor's supply costs.
- ✔ **Company publications:** Companies publish information for a variety of reasons. In some cases, they provide information to comply with industry rules or regulations. Corporations publish a glossy annual report for shareholders. Publicly traded companies must file Form 10-K with the Securities and Exchange Commission (SEC). This report may contain data that's helpful to your analysis. Look online.
- ✔ **The print media:** Many companies issue press releases to announce new products and services. Information appears in the general press and in industry journals. CEOs give interviews, too.
- ✔ **The Internet:** The Internet is the print media "writ large." Read company websites. See what analysis, industry experts, and journalists have to say about the company.
- ✔ **Reverse engineering:** An excellent way to gather information about a competitor and their products is through *reverse engineering*. You get their product and literally take it apart to see how the product was designed and assembled.

The auto and high-tech hardware fields do a lot of reverse engineering. The great added value to a car, computer, or a smartphone is the design, so the best way to keep up with your competitors is to pull apart their latest product and see how it works.

However, you may find surprises that have nothing to do with design. You can see, for example, where printed circuit boards were made or that the product was assembled in China, Indonesia, or Vietnam.
- ✔ **Intelligent guessing:** My experienced clients can make very shrewd guesses about how competitors are cutting corners to lower cost. A lawnmower manufacturer may say, "Oh, I bet they're using a low-quality blade." A restaurant owner may say, "My guess is that they use salad mix from a big bag instead of tearing the lettuce." Use your experience.

All of the intelligence (also known as the G2 or the MI6, for ex-military folks) can help you price your product intelligently.

### ***Implementing target cost and target pricing***

Now use what you've learned to create a target price and target cost. All costs, fixed and variable, are relevant costs.

Here are the steps to create your target price and target cost:

1. Choose a target price per unit.
2. Decide on a target operating income per unit.
3. Compute a target cost per unit.
4. Use *value engineering* to reach the target cost, if needed.



The overall goal is to increase product profitability. If the price is driven by outside market conditions or competition, the only way to improve your profitability is to cut costs. But which costs do you cut? First, eliminate those costs that don't add value.

*Value engineering* is a process that separates *value-added costs* from *non-value-added costs*. A value-added cost is necessary to produce a product to fit your client's needs. A value-added cost enhances the value of the product or service, making the product more attractive. That's a good thing. Nonvalue-added costs are just the opposite, and that's not a good thing.

Essentially, value engineering is the process that asks, "Do I really need to do that?" If the answer is yes, value will be added when you incur the cost. Consider rework costs — repairing a product defect. The cost of rework doesn't add value. The idea (of course) is to make the product correctly the first time. A rework cost is a nonvalue-added cost.

After you find nonvalue-added costs, take steps to reduce or eliminate them. Activity-based costing (see Chapter 5) explains that activities drive costs (cost drivers). To reduce the nonvalue-added cost, reduce the related activity.

Table 12-3 shows the target price and target cost calculations for a lawn mower company.

**Table 12-3 Lawn Mower Company — Target Price and Target Cost**

<i>Units Produced: 200,000</i>	<i>Per Unit</i>
Target price	\$290
Less target operating income	\$29
Equals target cost (A)	\$261
Current full costs (B)	\$270
<b>Cost to be removed (B – A)</b>	<b>\$9</b>

You decide on a target price of \$290 per unit for your lawn mowers. Earlier in this chapter, you noted that many competitors sell a similar lawn mower for \$300, so you price your mower slightly below \$300 to maintain competitiveness.

Your target operating income is your profit. Your goal is operating income of 10 percent of the target price ( $\$290 \times 10$  percent = \$29):

Target cost = target price - target operating income

Target cost = \$290 - \$29

Target cost = \$261

Your current full costs are \$270 per unit, \$9 above your target cost (\$270 - \$261). Your goal is to squeeze \$9 per unit of nonvalue-added costs out to reduce your full costs to the target cost.

Consider the design of your lawn mower. Your design team has installed a bigger, heavier flap that hangs off the back of the mower. It will provide better protection from debris flying up toward the user. Because this design change was made, you're committed to buying a larger plastic part for each mower. You haven't yet written the check, but you're committed to doing so.

### ***Thinking about design decisions and cost***

Good companies constantly innovate and change products. One reason is to meet changing customer needs. Your clients want product improvements, and you make design changes to accommodate them. Of course, design decisions can have a big impact on your costs.

Another reason to innovate (that is, to make design changes) is to remove nonvalue-added costs. It's a constant, ongoing process. Finding and removing costs helps you meet your target cost goals.

Think about design changes. You can reduce the number of moving parts. That would mean fewer parts to buy and assemble. It would also mean fewer parts that might break. Consider designing parts that are *easier* to assemble, too. You can reduce labor hours and machine time if you simplify the assembly process.

The automobile industry is always looking for ways to make cars lighter. Lighter cars get better gas mileage. This might mean using more of some types of material — such as aluminum or polycarbonate — and less steel. The goal is to address customer demand for more fuel-efficient cars.

So that's the news about good product design. Poor product design has the opposite effect. A faulty design change locks in an unneeded product cost. Maybe you decide to attach an umbrella to the top of each lawn mower; however, it doesn't sound like a design change customers want. The design change means you've locked in a cost (the umbrella) for each lawn mower. You haven't written the check yet, but you're committed to buying the umbrellas.

## *Arriving at a Reasonable Profit*

The search for a reasonable profit often starts with *cost-plus pricing*. Cost-plus pricing is a *bottom-up* method that starts with costs and adds a markup. Also, because very few products maintain the same level of sales decade after decade, you look at the concept of product *life cycle*.

Cost-plus pricing can be used only if your product is significantly different from other products in the marketplace. That's because you're adding a profit to your cost (a markup) and asking customers to pay that total sale price. The sale price might be much higher than other products sold by your competitors. To attract customers, your product must be very different.

### *Using cost-plus pricing*

*Cost-plus pricing* is a pricing method that starts with full costs (fixed and variable costs — the entire cost of your product). You then add a percentage markup (that is, a percentage of the costs). Here's the entire formula for cost-plus pricing:

Proposed selling price = cost base (full costs) + markup

Say you sell vinyl siding for homes. Your cost for a 10-foot unit of siding is \$7. You compute a 10 percent markup: ( $\$7 \times 10$  percent = \$.70). Your proposed selling price is shown as follows:

Proposed selling price = cost base (full costs) + markup

Proposed selling price = \$7 + \$.70

Proposed selling price = \$7.70

### *Reducing your markup*

If you have to cut your selling price, it's easier to reduce markup than to cut costs. So be flexible about that markup. If customers make a judgment that they can buy the same siding for \$7.25 a unit, they may buy somewhere else.

You need to consider cutting your selling price and accepting a smaller markup. A \$7.25 selling price would be made up of a \$7 cost basis and a \$.25 markup. That markup is 3.6 percent of cost rather than 10 percent. You're price-competitive, but at the cost of operating at a lower profit level.

Larger companies with sufficient assets (and especially big cash balances) sometimes accept breaking even for short periods of time. *Breakeven* means that revenue only covers cost. The product generates \$0 in profit.

A friend of mine works for a large construction company. Its clients are corporations who need to build or renovate factories. During a difficult economy, his firm made the decision to accept work that would simply be a breakeven deal.

The company made a decision that let it stay in business long-term. It was able to maintain relationships with clients and keep employees paid. This was all good, because many other construction companies were closing their doors because of a poor economy.

Often, companies that make it through difficult times end up with *more* business when things improve. They get new clients — those that previously were dealing with companies that closed.



One of the most important things about being in business is *staying* in business.

### ***Computing a target rate of return on investment***

There are several methods to decide on your markup. Although customer judgments about price and competitor pricing can limit the markup, there's another view.

*Target rate of return on investment* is a method you can use to compute a markup. It's a rate of return on the assets (investment) that you've invested in your business. First, consider rate of return on investment (also known as *ROI*).

Recall that assets exist to make money. You should have some idea about a reasonable rate of return on those assets. After all, you have choices. You can use the same assets to make several different products or provide several different services. You could also invest those assets in other companies and earn a rate of return. For example, the owner of a men's and women's shoe store might wonder if adding a line of sport shoes would have a better ROI than adding a line of children's shoes.

Say you operate a combination pizza parlor and barbeque restaurant (which is not an impossible fusion). You've added \$100,000 in capital (cash) to your business. You buy equipment and expand. You base your product decisions on how the \$100,000 investment would generate the most profit.

You invest the asset (cash) in equipment, labor, and advertising, finding a good balance between pizza ovens and barbecue equipment. Good news! You earn an additional \$10,000. Your incremental rate of return is 10 percent ( $\$10,000 \div \$100,000$ ).

Now you need to consider whether 10 percent floats your markup boat. To determine a reasonable rate of return, think about the source of your \$100,000 in capital. If you borrowed, and if the interest cost was 7 percent on a \$100,000 loan, a 10 percent ROI would probably be reasonable. The rate of return is higher than the interest cost. If you've sold an ownership interest in your business, consider what rate of return your investors expect on their investment.

Selling pizza and barbecue together isn't the strangest restaurant concept in the world. In California, there's a hot two-store chain called Tex Wasabi's Rock 'n' Roll Sushi BBQ. How's that for giving customers what they want? It may sound like an odd combination of products, but the company is filling a customer need.

### ***Weighing other issues with cost-plus pricing***

Cost-plus pricing is an inexact science. It can be difficult to determine the amount of capital you need for your product, and how to best spend it. Consider the \$100,000 in assets in the last section. Converting the \$100,000 cash asset to different assets (such as equipment and labor) is an exercise in estimating.

One way to think through your decision is to consider different cost bases and different markups on each cost base. For example, maybe you use variable cost as a cost basis and add a 6 percent markup. Next, you can look at full cost and add a 3 percent markup.

By adding markups and cost bases, you come up with different prices. You can then decide which price is most realistic. By realistic, consider your competition and markup percentage.

In the end, product pricing is about balancing factors. Consider the cost-plus pricing method (cost plus a markup). Balance that against target pricing (setting a price and then estimating costs).

## ***Using product life-cycle budgeting***

In various chapters in this book, you plan cost and prices over a month or year. It's not easy! Now you move into an area where you plan cost and prices over a product's life. The time frame is longer, the total costs are higher, and there's more financial risk if your forecast isn't accurate.

## More time, more financial risk

The father of a friend of mine has a doctorate in chemistry. He's one of a group of 12 people who patented the chemical compound for a major over-the-counter drug. (You see the product's commercials all the time.) I'm told that it took 13 years from the time the compound was

discovered to get to the point where the product was on the shelf. So a major drug company paid chemists to find the compound and then spent another 13 years testing, getting government approval, and marketing the drug. Imagine the financial risk to the drug company.

*Product life-cycle budgeting* is a planning method used to determine if a product is profitable over the long term. All the assets you plan to invest in a product could be used somewhere else, and you don't want to make a poor decision. You'd miss the chance to invest in another product that would be more profitable. Product life-cycle budgeting may be hard, but it's not impossible, and many companies need to do it.

### *Assessing the risks of your product's life cycle*

There can be huge risks over a product's life. Here are some examples:

- ✓ Large upfront costs unrelated to production
- ✓ Long time periods to implement nonproduction activities
- ✓ Large number of locked-in costs
- ✓ Need to track costs over multiple time periods
- ✓ Competition could beat you to market

Discovering drug compounds that can be approved for medical treatment is expensive. The main cost is *research and development* (R&D), the cost to staff a department that conducts research and experiments on new products.

A risk for a pharmaceutical company is spending years (and millions of dollars) on product ideas that aren't viable.

Research and development costs are expensed as they're incurred. Consider what you've seen on the matching principle (see Chapter 9 for more).

The idea of the matching principle is that you match the revenue generated with the expense related to that revenue. *Match* means that the expense and revenue are recorded in the same accounting period (month or year). Good idea, but it's hard to do with the long-term development of a product.



The issue with R&D is that you often can't easily know which expenses led to a product that created revenue. If you sell a product that started in research and development ten years ago, which costs would you match with the revenue? Which years of R&D would you expense?

The solution to the R&D issue is to apply the conservative principle of accounting (see Chapter 9 for more). When there's a need to make a judgment, err on the side that shows a less attractive financial picture.

If you can't match an expense with a source of revenue, expense the cost immediately. That way, your current year's financials will reflect the higher expense — and less profit.

Decisions about product design create locked-in cost. If you develop a product over years, you're accumulating the cost of many design decisions. That leads to more locked-in costs. The automotive industry is the prime example. A car design is made up of hundreds (maybe thousands?) of individual design decisions. Each of those decisions will lock in material costs, as well as labor and machine costs.

### ***Considering pricing strategies and life cycles***

How you price your product is critical to the long-term success of your product. Further, the price may change (with good reason) many times during the product's life. Your pricing strategy has a huge impact on long-term profit.

Your pricing is influenced by your competitor's behavior (mainly pricing, but other factors, too). The customer's perceived value of your product is also a factor.

*Skimming the market* is the concept of charging a higher price for a new product. Your target customers are those who really want to try your product to "be one of the first."

The best example is technology. Everyone knows someone who's a gadget-loving techie. That's the kind of customer you're trying to reach when you skim the market. When that target group of customers has made a decision on purchasing, you probably have to change your pricing. You then reach another target group who are thinking, "Oh, I'll buy one of those when the price comes down."

*Customer life-cycle costs* represent the total process your customer goes through. The customer considers your product, buys it, uses it, and then (hopefully) considers buying it again. There are costs throughout the life cycle. Some describe this process as the cost to buy and use the product until it needs to be replaced. Some call it *total cost of ownership*.

Think about a new car or any big-ticket-item purchase. There are three cost components the customer considers:

- ✓ The purchase price of the product
- ✓ The cost to operate and maintain the product
- ✓ The disposal value of the product

When you buy a new car, it's obvious that you are putting out cash. If you finance the car, you're making payments and paying interest on the loan.

The new car comes with an owner's manual that includes a maintenance schedule, so you know how often the car needs oil changes, tune-ups, and so forth. You know that there's a cost to maintain the vehicle. If you don't maintain it, it won't operate correctly.

With a car, the disposal value is the trade-in value. When you go to a car dealership to replace the car, you negotiate a value for the old vehicle. That value reduces the cost of your new car. If you add the costs related to the bullet points above and subtract the disposal value of the car, that's the total cost of the product — purchase price + maintenance — disposal value. (Of course, you can always sell your old car privately for cash, which still should be included in the formula above as disposal value.)

Some carmakers use low cost of ownership to justify a higher selling price. Essentially, they're saying, "Our cars are built better than the competition. You pay more now, but you save with the lower maintenance costs."

*Price discrimination* is the strategy of charging different customers different prices for the same product. Now, you might say, "That doesn't make any sense. Word will get around, particularly with all the information on the Internet. Why would one customer pay more than another?"

The reason price discrimination works as a strategy is that cost isn't always driving the buying decision. Consider buying tickets to a major sporting event, maybe the Super Bowl. What you see with price discrimination is that customer behavior can be very different from "normal" — maybe dramatically different.

*Demand inelasticity* exists when demand for a product doesn't change with the price. Some buyers are insensitive (or less sensitive) to price changes. Their demand for the product won't change much as price changes. Think of these customers as the "must have, must go" customers.

Corporations use tickets to big sporting events for several reasons. A ticket can be a performance reward for a company manager. And tickets are a goodwill gesture to reward a customer or a supplier.

Therefore, corporate buyers are less sensitive to ticket price changes. I've seen situations in which a company paid a huge premium to get tickets for a valued customer, and at the last minute, too. The focus is on the person who's getting the ticket, not the price.

*Price elasticity* (sometimes called *price elasticity of demand*, or *PED*) exists when buyers (such as ticket buyers) are sensitive to price changes. Think about a rubber band stretching and contracting. That's what happens to demand as prices change. When a big Broadway musical offers group rates, student rates, and special rates for buying at the last minute, customers sensitive to price will buy.

Big fans of a team love their team, and when the team makes it to the big game, they want to go. But there's a limit to what they're willing to pay for a ticket. (Often, another family member who pays the bills is driving that cost decision.)

You probably know people who are big fans. Many of these people say to themselves, "Well, I'll go to the city where the game is. If I can get tickets, great. If they're too expensive, I'll watch the game somewhere close to the venue. At least I'll feel like I'm there." For this group, if prices go up, demand goes down. If prices go down, the big fans will jump on any available tickets.

If you understand the price elasticity of the groups of customers who want your product, you have an advantage. You can offer different groups different prices. Again, you're selling the same product (such tickets, in this example). The result is your average price, and the sales totals are enough to generate a reasonable profit.

*Peak-load pricing* is the technique of charging higher prices for the same product when demand is peaking. Here's a simple way of saying it: "If you want the product now, Mr. Customer, you have to pay more for it. That's because *everybody* would like the product now."

The best examples are in the travel industry. Think about hotels near the ocean. They usually have a higher room rate when the hotel is in demand. That might be summer, or during a busy vacation period (December holidays, school spring break, and so forth). In fact, the hotels may use the terms *peak* and *off-peak* to describe room rates.

Consider using peak-load pricing in your business. If demand is high, charge a premium (higher) price. Remember that at some point, business may slack off. When that happens, you may have to offer a lower price for your product.

### *Pricing decisions and regulation*

Every business has to deal with regulation to some extent. Regulators, in this case, protect consumers so they are treated fairly. They accomplish this by enforcing *U.S. antitrust law* (sometimes called *competition law*). The laws that outline fair pricing practices are in place to ensure fair trade and to protect consumers.

If you have some awareness of these issues, you may be able to recognize a situation when a competitor is violating a regulation or law. This isn't a law book, but an overview will help your business.



I think any suspicions you have about pricing should meet the common sense test. An experienced businessperson (like you) can often see when a deal looks “off.”

If a business is selling a product at a loss (and you see specifics in a minute) *that* is a regulatory red flag. Because no company can survive over the long term selling at a loss, there may be something shady going on.

Price discrimination is okay. If a company's goal is to maximize profit, no problem! That's perfectly reasonable and allowed. If a company is using price discrimination to *destroy competition*, that's a regulatory problem.

Consider how much a competitor is cutting prices. If you think it's to the point that there isn't a profit, ask yourself why. Some reasons are legitimate, and some aren't.

The company may view a product as a loss leader. A *loss leader* is a product sold at a loss to entice people into the store. The hope is that the same customer may also purchase another product that is profitable. The goal is to develop new customers and more revenue over the long term. That's a perfectly reasonable strategy.

There may also be a purpose with less integrity. It's called *bait and switch*. When the customer comes to the store, she sees that the product is so inferior that she buys a costlier model.

### *Circling with the vultures*

Contrast price discrimination with predatory pricing. *Predatory pricing* is the act of setting a low price to eliminate competition. Now, that's far different from a loss leader.

Here are the key points about predatory pricing:

- ✔ The predator company charges a price below its costs.
- ✔ The prices are so low that competitors are driven out of business.
- ✔ Fewer competitors reduce the supply of product.
- ✔ The predator company raises prices, taking advantage of the decline in supply.

It almost sounds like the plot of a movie, doesn't it? But it happens in real life. In 1904, Standard Oil controlled 91 percent of production and 85 percent of final sales of petroleum. The federal Commissioner of Corporations studied Standard's operations and concluded "beyond question . . . the dominant position of the Standard Oil Company in the refining industry was due to unfair practices — to abuse of the control of pipelines, to railroad discriminations, and to unfair methods of competition in the sale of the refined petroleum products."

For the purposes of this book, predatory pricing is defined as selling a product below variable costs. With a special order, the assumption is that other production covers fixed costs. So a special order just has to be priced above variable costs, and you make a profit. That's okay. But if your selling price is below variable costs, that's a red flag to a regulator.

*Dumping* occurs when a non-U.S. company sells a product in the United States, and the price is below the market price in its home country. Dumping has an impact. It has an adverse effect on a U.S. company that sells a similar product. The U.S. company has to show that it was "harmed" or "injured," but that's a legal issue.

*Collusion pricing* (also known as *price fixing*) occurs when companies collude, or work together and agree to keep prices artificially high. Are you shocked? Companies collude to achieve two outcomes. First, they hope to set a price above a normal competitive price — the price that a customer would pay in a true free market. Second, they hope to *restrain trade*. Restraint of trade is simply some kind of agreed-upon provision that's designed to limit another's trade.

Predatory pricing, dumping, collusion pricing, and restraint of trade are tools used by unethical businesses. Some elements are designed to "game" the system, and others are designed to force out competitors. No competition, no problem, right?