

Chapter 4

Financial Analysis for Marketing Decisions

In this chapter we address the third element of what marketing managers must understand: the financial implications of marketing decisions (see Figure 4.1).

FINANCIAL ASSESSMENT

After the analyses described in the previous chapters have been completed, financial assessment should be undertaken. The financial assessment usually covers at least four different areas: (1) revenue

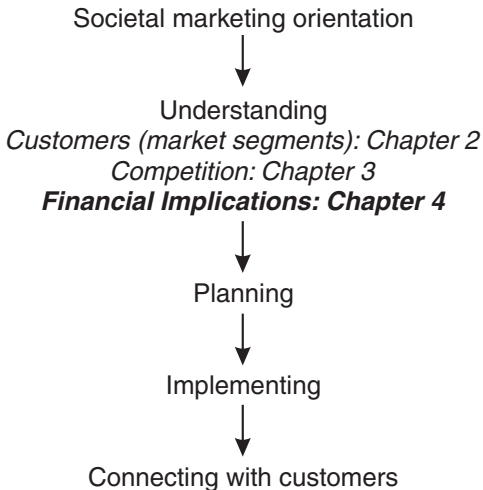


FIGURE 4.1. The Effective Marketing Management Process

analysis, (2) cost analysis, (3) cash-flow analysis, and (4) analysis of return on investment (ROI).

One of the most beneficial ways to combine these four types of analyses is to utilize a pro forma income statement. It is the basic document to be generated by the financial analyses. A pro forma income statement is a projected income statement for a specific future time period using estimates of the revenues and costs associated with that time period. It provides an estimate of future cash flows to be produced by a given market segment which can be discounted to determine the present value of these cash flows. This, in turn, is used in calculating the rate of return anticipated as achievable from a given segment.

A pro forma income statement for a proposed opportunity is shown in Table 4.1. The approach used for this venture was to develop three alternate pro forma statements, each based on a different assumption about revenues generated by the new venture. This approach permits identifying the “optimistic,” “pessimistic,” and “most likely” scenar-

TABLE 4.1. Pro Forma Income Statement

	Low (pessimistic)	Medium (most likely)	High (optimistic)
Sales	3,500,000	4,500,000	5,500,000
Cost of sales	-2,500,000	-3,400,000	-4,300,000
Gross margin	1,000,000	1,100,000	1,200,000
Expenses			
Direct selling	457,000	480,000	512,000
Advertising	157,000	168,000	180,000
Transportation and storage	28,000	38,000	48,000
Depreciation	15,000	15,000	15,000
Credit and collections	12,000	14,000	16,000
Financial and clerical	29,000	38,000	47,000
Administrative	55,000	55,000	55,000
Total	753,000	808,000	873,000
Profit before taxes	247,000	292,000	327,000
Net profit after taxes (NPAT)	128,440	151,840	170,040
Cash flow (NPAT + depreciation)	143,440	166,840	185,040

ios of a given situation. It is also in line with a more realistic approach to demand forecasting which produces a range of sales volume for new products. When products or services have already been on the market for several years, industry sales history is available to use in projecting sales.

Revenue and costs can change radically over the course of a product's life cycle. For example, high investments in promotion and building a distribution network produce losses in early years; while, on the other hand, reduced variable costs achieved by increasing production efficiency and technological improvement may produce high profit levels in later years. Consequently, any realistic financial analysis must take into consideration an adequate time frame and associated changes in cost structures.

Since the financial analysis of a given opportunity is usually long run in nature, either the pro forma must be estimated for each year for some assumed length of time, or an "average" year can be used which represents three to five years into the future. Then the discounted cash flow from this year is used as an average for the venture's anticipated life to calculate the ROI or break-even point of the project.

If subjective probabilities are assigned to each alternative, then decision tree analysis can be used to calculate an expected value for the cash flow from the project. Subjective probabilities are assigned by the analyst based on judgment rather than chance processes. When the alternatives are evaluated in a "tree" diagram, a schematic chart of the decision problem showing each alternative and the likelihood of each alternative is developed. Otherwise, the ROI can be calculated for each alternative and then compared with a predetermined rate to evaluate the financial impact of each alternative.

Developing a pro forma income statement requires a forecast of both expected revenues and operating expenses. The procedures for developing each of these estimates are discussed later in this chapter. Thus, the revenue analysis produces an estimate of revenues, the cost analysis produces an estimate of the costs associated with those revenues, and the analysis of ROI or break-even point relates those returns to the investment to be made in the venture. This, in turn, provides the answer to the basic question posed in financial analysis: What is the projected financial impact of pursuing this particular market opportunity?

Not-for-Profit Financial Analysis

Many not-for-profit organizations fail to apply opportunity assessment to their decision making. A large hospital, for example, decided to build a new wing for geriatric outpatients to provide rehabilitation services for those suffering from major traumas such as strokes or heart attacks. The facility was built to accommodate twenty-five patients. However, when it opened, only two patients showed up to take advantage of the new facility. An analysis of demand for such services prior to their provision would have avoided such a costly mistake.

Although the analysis of returns from a decision made by a not-for-profit organization uses different criteria, such an evaluation should be made nonetheless. This type of analysis is simply an application of a basic management concept—evaluate the impact of a decision *before* you make it. This principle applies to not-for-profit as well as for-profit organizations. One type of analysis especially suited for not-for-profit organizations is benefit-cost analysis which is discussed later in this chapter.

REVENUE ANALYSIS

Once the size of the total market has been estimated and the competition analyzed, the next step in the market opportunity assessment process is to estimate the sales revenue the opportunity can be expected to generate on an annual basis. The point is not trying to determine how many consumers will buy a product or service, but how many will buy *your* offering of that product or service.

Forecasting Market Share

For established markets, forecasting involves estimating market share. The question is, “What share of total sales can we reasonably expect to attain?” The percent is then converted to a dollar amount—the sales revenue expected in a given time period. The key element in the estimate at this point is judgment. (If a test market is used later in the development process, this estimate can be reevaluated for soundness.)

This judgment is based on an analysis of your offering versus competitive offerings. If four competitors are in the market and your product is expected to compete on an equal footing with other offerings, then a 20 percent market share should be used as an initial estimate of market share. This basic estimate would then be raised or lowered to reflect competitive strengths and weaknesses in the market.

For new products and services not currently on the market, an acceptance rate must be estimated. The acceptance rate is the proportion of the segment that will buy your product or use your service. Two approaches can be used to estimate the acceptance rate. These are described next.

Judgment Estimates

One way to estimate the acceptance rate is to use judgment. After careful analysis of the market, the person preparing the feasibility study sets the rate, in conjunction with other people who are knowledgeable about the market. Such an “educated guess” can be effective if people who are knowledgeable about a market—retailers, wholesalers, industrial users—are consulted. This estimate also reflects what the company can bring to the market in terms of marketing skills and innovation, brand equity, and the like.

Consumer Surveys

Another approach to estimating the proportion of consumers who would buy a new offering is a survey of potential consumers. Data obtained in this way have been referred to as “iffy” data, e.g., “I would buy your product *if* it were offered on the market and *if* I were in the market at that time, and *if* . . .” Although purchase intent statements in survey research cannot be taken completely at face value, various methods of discounting stated purchase intent are available to reflect realistic estimates of actual purchase behavior that can be expected in the marketplace. For industrial users, however, surveys with purchase decision makers can be highly effective since they are in a position to evaluate the use of a product in a more judicious manner than many individual consumers.

These two approaches are often combined to provide a sales forecast. A set of assumptions—about market acceptance, competitive reactions, economic conditions, degree of distribution, and promotion—must also be developed as a basis for the forecast. These assumptions must precede the actual dollar forecast used in the pro forma income statement.

An example of how these approaches can be combined to estimate sales revenue is shown in Table 4.2. This table shows the estimates of attendance at a proposed themed water park. Assumptions were made about the penetration or acceptance rates by the market segment and

TABLE 4.2. Attendance Projections

Facts/assumptions attendance/penetration	Alternative attendance forecasts		
	Low	Most likely	High
(a) Local market population	520,000	520,000	520,000
(1) Target market (ages 10-25) penetration	120,000	120,000	120,000
	$\times .65$	$\times .70$	$\times .85$
attendance	<u>78,000</u>	<u>84,000</u>	<u>102,000</u>
(2) Local market (other age groups) penetration	110,000	110,000	110,000
	$\times .03$	$\times .05$	$\times .07$
attendance	<u>3,300</u>	<u>5,500</u>	<u>7,700</u>
(b) Regional market population	100,000	100,000	100,000
penetration	$\times .10$	$\times .15$	$\times .20$
attendance	<u>10,000</u>	<u>15,000</u>	<u>20,000</u>
(c) Tourist market population	250,000	250,000	250,000
penetration	$\times .03$	$\times .05$	$\times .07$
attendance	<u>7,500</u>	<u>12,500</u>	<u>17,500</u>
(d) Group sales market attendance	18,000	20,500	25,000
(e) Repeat business attendance	72,000	78,000	95,000
Total attendance (a+b+c+d+e)	188,800	215,500	267,200

the number of repeat visitors that could be expected. The admission charge was anticipated to be fifteen dollars per person given the following alternative sales forecasts:

Low forecast	\$2,832,000	(188,800 x \$15)
Most likely	\$3,232,500	(215,500 x \$15)
High forecast	\$4,008,000	(267,200 x \$15)

A sales range of about \$2,832,000 to \$4,008,000 was estimated. To derive a figure for the pro forma income statement, the following probabilities were assigned to each forecast:

Low forecast	.25
Most likely	.50
High forecast	.25

The *expected value of sales revenue* (EVSR) was then computed by multiplying the expected sales revenue by its associated probability as follows:

$$\begin{aligned} \text{EVSR} &= [(\$2,832,000) (.25)] + [(\$3,232,500) (.50)] + \\ &\quad [(\$4,008,000) (.25)] \qquad \qquad \qquad (4.1) \\ \text{EVSR} &= \$3,326,250 \end{aligned}$$

This final value, \$3,326,250, was used as the estimated sales revenue to be generated from attendance in the pro forma income statement.

COST ANALYSIS

The bottom line of any operation or project is significantly affected by the underlying cost structure. Consequently, cost analysis is closely allied with revenue analysis. Once revenue estimates have been made, cost analysis must be carefully considered. This section will discuss various cost concepts, cost information sources, cost sensitivity analysis, technical analysis, and cost forecasting.

Cost Concepts

Accounting for the costs of conducting business operations is complex. This is also true of analyzing costs for market opportunity assessment. As a business functions, assets lose their original identity. The business operation converts the assets into some other form. For example, raw materials of many kinds may go into a final manufactured product and many of these raw materials may be unrecognizable in the end product. Costs, however, are traced through the business operations as the assets and resources are converted into goods and services. Since the profits and losses of a business are measured as the difference between the *revenue* received from customers and the *costs* associated with the delivery of the products or services, a project cannot be judged as feasible or profitable without dependable cost estimates.

Types of Costs

Because there are many different types of costs, they must be selectively chosen to match the purpose for which they are used. Care must be taken to understand the specific application of a cost under consideration. Costs can be divided into several major categories, some of which will be very instrumental in developing the project cost summary discussed later in the chapter.

Period costs. Period costs are associated with and measured according to time intervals rather than goods or services. For example, equipment rental may be at the rate of \$1,200 a month. Regardless of the amount of business or product supported by the equipment, the rental cost of the equipment remains \$1,200 each month. This expense amount is allocated against revenue according to the time interval without regard to the amount of business transacted. Equipment expense for the year will show \$14,400 on the income statement. Generally speaking, selling and administrative costs are designated as period costs.

Product costs. In some cases it is inappropriate to classify costs as period costs. Some situations in the income determination process call for costs to be offset as expenses against the activity, good, or service that produced the revenue. Under this concept of income determination, the period in which the benefit is received is the period in which the costs should be expressed and deducted as expenses. Fol-

lowing our equipment rental example, the equipment rental for a certain period should not be charged off as rent expense for that period if the goods produced by the equipment are not sold until a later period. If costs of this type are handled as product costs, they are matched against the revenue generated from their sale in the period of that sale. In most cases, manufacturing costs are treated as product costs rather than period costs and are included in the cost of goods sold.

Fixed costs. Costs that can be expected to remain constant over a period of time regardless of activity levels are called fixed costs. Examples of this type of cost are executive salaries, interest charges, rent, insurance, equipment leases, depreciation, engineering and technical support, and product development expense. Obviously, a fixed cost, like any other cost, can be increased or decreased, particularly in an inflationary period. These variations, however, are caused by other external factors and not caused by the firm's output or activity.

Fixed costs can be broken down further as committed fixed costs and discretionary fixed costs. Various management decisions may commit the company to a course of action that will require the company to conform to a certain payment schedule for a number of years in the future. Costs incurred in this way are committed fixed costs. The costs related to acquiring a new building are examples of committed costs. On the other hand, discretionary fixed costs are established as a part of a budget that can be altered by management action on a monthly, quarterly, or yearly basis. These costs are much more easily altered, and have a high degree of flexibility. Examples of discretionary fixed costs are the research and development budget or supervisory salaries that are set by management action.

Variable and semivariable costs. Costs that vary closely with production are considered variable costs. In the strictest sense of the term, variable costs should vary in direct proportion to changes in production levels. Direct material cost and direct labor costs are good examples of variable costs. Most costs, however, are semivariable. Semivariable costs tend to fluctuate with volume, but not in a direct relationship to production. Market research expense, advertising and sales promotion expense, supplies expense, and maintenance expenses are all examples of semivariable expenses. In some cases, semivariable costs can be broken down into fixed and variable components to make application for decision making possible.

Direct and indirect costs. Direct costs are those identifiable with a particular product, activity, or department. Indirect costs are not directly identifiable with any particular product, activity, or department. Often, the distinction between direct and indirect costs depends upon the unit under consideration. A cost of specific supplies used may be identified directly as a cost of a particular department but may not be a direct cost of the product manufactured. When a cost can be directly identified to the unit under consideration, it is considered a direct cost relative to that unit. When a cost is associated with a unit only through allocation, it is an indirect cost.

Controllable and noncontrollable costs. Like direct and indirect costs, a reference point is required to classify costs as controllable or noncontrollable. Obviously, at some point in the organizational structure, all costs are controllable. Top management can dispose of property, eliminate personnel, terminate research projects, or whatever is necessary to control costs. At middle and lower levels of management, however, costs can be termed as noncontrollable. If a specific level of management can authorize certain costs, then these costs are considered controllable at that level. A plant manager, for example, may have control over the supplies used by his or plant, but he or she may have no control of promotional costs established by central headquarters.

Sunk costs. A sunk cost is usually a cost that was spent in the past and is irrelevant to a decision under consideration. Sunk costs may be variable or fixed.

Differential costs. The purpose of cost analysis is to provide management with the data necessary to compare alternatives and make a choice. In order to simplify the comparison of alternatives, any costs that remain the same regardless of the alternative will be disregarded in the analysis. A difference in cost between one course of action and another is referred to as a differential cost. In most cases the decision will result in an increased cost. This increased differential cost is often specifically referred to as an incremental cost. Differential costs are often referred to as marginal costs when the differential cost is the additional cost required to produce one more unit of a product.

Opportunity costs. Ordinarily, costs are viewed as outlays or expenditures that must be made to obtain goods and services. The concept of opportunity costs extends this to include sacrifices that are made by foregoing benefits or returns. An opportunity cost takes into

consideration the fact that choosing one of several alternatives precludes receiving the benefits of the rejected alternatives. The sacrifice of a return from a rejected alternative is referred to as the opportunity cost of the chosen alternative. Many of the costs mentioned are overlapping in nature. Thus fixed cost may also be a sunk cost, noncontrollable cost, or a period cost. Judgment must be used in identifying specific costs in the development of cost estimates for a specific opportunity or business venture.

Data Sources

Many sources of data are found in a company's historical records. These records can provide cost information to establish reasonable cost estimates. Many other sources of data provide information to form the basis of a reliable cost forecast. Some of these are listed next:

- *Trade publications*—provide comparative financial ratios, cost-of-goods-sold information, gross margin data, and other information.
- *Time studies*—establish standards for estimating labor cost.
- *Experiments*—test processes in terms of time, material, labor, and other resources necessary to complete production processes.
- *Pilot plant or process activities*—involves the intermittent or continuous operation of a new plant activity or process to perfect engineering specifications and to establish cost standards.
- *Historical cost data*—these can include past material cost, labor cost, overhead expense, administrative costs, utility expense, and many other categories of expense.
- *Interviews*—correspondence include personal, telephone, and mail designed to gather data that provide primary cost information unavailable from other sources.

Cost Behavior, Sensitivity Analysis, and Risk Analysis

Before moving on to the actual development of detailed cost forecasts, a discussion of sensitivity analysis is in order.

Sensitivity Analysis

Sensitivity analysis is a technique that illustrates how the costs of an operation or activity will be affected by changes in variables or by errors in the input data. Sensitivity analysis is sometimes called “what if” analysis because it asks and answers questions such as, “What if labor costs increase an average of \$1.75/hour?” and “What if sales fall to 350,000 units?”

Other questions that can be answered by sensitivity analysis include the following: “What happens to profits if we change the selling price?” “What happens to profits if we buy more efficient equipment, change our formulation and accompanying cost structure, or increase or decrease personnel?” The starting point for sensitivity analysis is to establish a base case or most likely situation. Once the base case or most likely forecast elements are established for items such as unit sales, sales price, fixed costs, and variable costs, the analyst will selectively change key variables to determine their impact on the base case results. The analyst can ask all the “what if” questions necessary to see the effect of changes in variables such as product price, raw material costs, and operating costs on the overall results of a project. The analyst can determine which variable has the most negative or positive effect on the project’s profitability. Given the possible range of a variable, such as material costs, the range of effects on the outcome can be calculated and charted. The more sensitive the outcome is to the tested variable, the more serious an error in estimating the variable would be. The purpose of sensitivity analysis is to identify the variables that have the stronger impact on the outcome of a project. Sensitivity analysis is effective in determining the consequences of a change in a variable.

Break-even analysis. To construct a break-even analysis, one must have estimates of fixed costs, variable costs per unit, volume of production, and price per unit. As discussed earlier, fixed costs do not change with the level of production. Variable costs are directly related to units of production and change with the level of production. The following list illustrates different costs attributable to fixed costs and variable costs.

Fixed costs

Depreciation
 Plant equipment
 Fixed utilities
 Office expense
 Insurance
 Rentals
 Debt interest
 Salaries (executive and office)

Variable costs

Factory labor
 Material costs
 Commissions
 Freight in and out
 Variable factory expense
 Utilities (other than fixed)
 Cost of goods sold
 Sales expense

The elements and relationships of break-even analysis are illustrated next:

$$\text{Break-even (BE) } Q = \frac{FC}{P - VC}$$

Where: FC = Fixed costs
 P = Sales price per unit
 Q = Quantity of production in units
 VC = Variable cost per unit
 P - VC = Contribution margin

Expressed another way:

$$\begin{aligned} \text{Total revenue} &= \text{Total cost at the break-even point} && (4.2) \\ \text{TR} &= \text{TC} \end{aligned}$$

or

$$\begin{aligned} \text{TR} - \text{TC} &= 0 \text{ (at break-even point)} \\ \text{TR} &= \text{PQ} = \text{Total revenue} \\ \text{TC} &= \text{FC} + \text{VQ} = \text{Total cost} \end{aligned}$$

Substituting:

$$\text{PQ} = \text{FC} + \text{VQ}$$

Solving for Q will derive break-even quantity.

In a situation in which a new production line is being considered, the following data might be indicated by market analysis:

Production line capacity	=	2,200 units	
Potential selling price	=	\$220/unit	= P
Fixed costs	=	\$60,000	= FC
Variable costs	=	\$170/unit	= VC

When $TR = FC$, the break-even point is 1,200 units.

$$\begin{aligned}
 PQ &= FC + VQ \\
 \$220 (Q) &= \$60,000 + \$170 (Q) \\
 \$220 (Q) - \$170 (Q) &= \$60,000 \\
 \$50 (Q) &= \$60,000 \\
 (Q) &= 1,200 \text{ Units}
 \end{aligned}$$

Solved another way:

$$BE = \frac{FC}{P - VC} = \frac{\$60,000}{\$220 - 170} = \frac{\$60,000}{\$50}$$

Break-even point by quantity

$$BE = 1,200 \text{ units}$$

To apply sensitivity analysis, the analyst might use various values of volume, price, variable cost, and fixed cost to measure their relative effect on profit.

Table 4.3 illustrates changes in volume of production (and sales) of 100 unit increments above and below the break-even point. The table also shows the impact of these changes in production on profits and that changes in the volume of production and sales near the break-even point result in large variations in profits and losses.

Using the same basic formula shown in equation 4.2, an analyst can test the sensitivity of price and profits (see Table 4.4).

Equation 4.2 shows a production capacity of 2,200 units and a break-even point of 1,200 units. If market analysis shows a market potential in the range of 1,400 to 1,700 units, then the project can be

TABLE 4.3. Sensitivity Analysis of Production and Profits

Volume	Profit (loss)	Incremental percent change
700	(25,000)	25
800	(20,000)	33
900	(15,000)	50
1,000	(10,000)	100
1,100	(5,000)	
1,200	0	
1,300	5,000	
1,400	10,000	100
1,500	15,000	50
1,600	20,000	33
1,700	25,000	25

TABLE 4.4. Sensitivity Analysis of Price and Profits (Volume Set at 1,200 Units)

Price	Profit	Incremental percent change
180	(48,000)	
190	(36,000)	33
200	(24,000)	50
210	(12,000)	100
220	0	
230	12,000	
240	24,000	100
250	36,000	50
260	48,000	33

considered a viable proposition. Further calculations can be made to estimate a range of profits based on previous cost assumptions.

$$\text{Profit} = \$220 (1,700) - \$60,000 - \$170 (1,700)$$

$$\text{Profit} = \$374,000 - \$60,000 - \$289,000$$

$$\text{Profit} = \$25,000$$

$$\text{Profit} = \$220 (1,400) - \$60,000 - \$170 (1,400)$$

$$\text{Profit} = \$308,000 - \$60,000 - \$238,000$$

$$\text{Profit} = \$10,000$$

The analyst can use the same calculation method to compute a minimum sales price for any level of volume. Other variations can be used to determine the effect of changes on profit and loss. Break-even analysis, used in this way, provides managers with a profit or loss estimate at different levels of sales and at different cost estimates. It can also approximate the effect of a change in selling prices on the company.

Sensitivity analysis can be applied to other techniques of analysis as well. It may be used in the capital budgeting decision using discounted cash flows. Changes in the required rate of a return can be quickly converted into changes in the project's net present value, which represents the potential increase in wealth the project offers. The discounted cash flow method of making capital budgeting decisions will be discussed more fully later in this chapter.

Other uses of sensitivity analysis include testing price change impact on sales plans, testing changes in the productive life of equipment, and testing the changes in demand on profitability.

Risk Analysis

Sensitivity analysis is appropriate for asking "what if" questions and for determining the consequences of various changes in relevant variables. Sensitivity analysis, however, cannot identify the likelihood that a change in a variable will occur. Risk analysis is the process used to identify and assign a degree of likelihood to changes in important variables that may be essential in determining the feasibility of a project or venture.

The process of cost forecasting. The use of cost estimates for planning purposes is very important in developing the project cost summary. The firm's chief accounting officer should be instrumental in assembling the cost data used as a basis for a company's new venture activities.

As demand analysis estimates the market potential of the new project, product, or services, cost analysis is the basis for determining the actual financial and technical feasibility of the proposed activity.

Cost estimates must be provided for the following categories:

1. Fixed investments such as land, buildings, fixtures, and other equipment
2. Manufacturing costs such as direct material cost, direct labor cost, and manufacturing overhead
3. Start-up expenses such as training costs, increased overtime, scrap expense, consulting fees, and legal fees
4. Marketing expenses such as warehousing, distribution, promotion, and selling costs

A broad series of assumptions and decisions must be made to provide the framework for developing these cost estimates. A detailed step-by-step forecasting checklist must be followed to establish accurate cost estimates. An example of this type of checklist is illustrated in Figure 4.2.

Yes	No	
___	___	Are the objectives of the study clearly defined?
___	___	Are the various alternatives clearly identified?
___	___	Are reliable cost estimates available for fixed investment, manufacturing costs, and other related start-up costs?
___	___	Are the likely changes in material costs identified?
___	___	Are the likely changes in labor costs identified?
___	___	Are the changes in unit factory overhead rates caused by the proposed production identified?
___	___	Has the demand analysis provided a realistic forecast of sales?
___	___	Have the production personnel provided estimated overhead costs for the new project based on the sales forecast?
___	___	Have all appropriate departments submitted budget estimates (general and administrative departments, warehousing and distribution, selling and advertising, research and development, and so forth)?
___	___	Has a final project cost summary been completed?

FIGURE 4.2. Cost Forecast Checklist

Accurate cost estimates require a solid analysis of the technical requirements of projects. This type of analysis will vary in depth with each project. Technological complexity, the amount of resources required to accomplish the project, and the number of viable alternatives will influence the amount of attention given to the technical analysis. Most new ventures have enough “unknown” characteristics to require close attention to the specific aspects of the project. The project cost summary provides the information necessary for a projected statement of the cost of goods sold. This summary, coupled with information from the market analysis, provides the basis for the pro forma income statement, which estimates the profitability of the project. Additional aids can now be produced to assist the planner such as pro forma balance sheets, cash flow projections, and detailed cost summaries.

Forecasting procedures. Cost forecasting can utilize many of the tools described in forecasting sales. Developing cost forecasts of totally new ventures for which there are no historical cost figures is more difficult and subject to greater error than forecasts for projects that have cost histories.

The correct procedure to forecast costs varies from project to project. The objective of cost forecasting is to approximate the real expenses involved in an undertaking so that profitability can be projected. The actual procedure for forecasting cost may be determined by an examination of the objectives and resources of the principals to the venture.

The following forecasting techniques can be used to estimate costs.

Judgment techniques—The various experiences of key personnel have led to heuristics or “rules of thumb” that can, in some cases, determine certain types of costs. These techniques are subjective in nature and should not be the sole basis for cost analysis.

Survey techniques—Just as market information can be acquired through consumer surveys, so can cost information. One-on-one or telephone interviews with persons who have experience in the appropriate field are commonly used. Such surveys of expert opinion can generate helpful cost data.

Historical data techniques—When historical data are available, cost forecasting can be accomplished by making certain subjective assumptions and then projecting historical cost elements into the future.

Trend analysis—Programmable hand calculators can project past points of costs to specific future dates. A simple technique of plotting the past cost history of a certain cost element can be helpful. The scatter diagram technique charts cost data for a number of periods. However, many costs are distinct entities and cannot be projected in the same way that sales can.

Multiple regression—Multiple regression is a more sophisticated approach to forecasting. In simple regression, a cost is assumed to be the function of only one variable. In multiple regression, the cost or dependent variable is dependent on a number of variables.

Percent of sales—Many costs can be adequately expressed in a percent of sales format. Sales commissions, for example, are calculated as a percentage of sales. A good sales forecast is an essential foundation for this method of estimating costs. The percent of sales method implies a linear relationship between sales and the expense item being calculated. Not only can certain expense items be forecast as a percentage of sales, but balance sheet items and external financing requirements can be developed by this method as well. Table 4.5 illustrates some important costs expressed as a percent of sales.

PROFITABILITY ANALYSIS

The final and perhaps the overriding consideration in defining the exact nature of an opportunity is the potential profitability it represents. Previous sections have dealt with the analysis of demand and the forecasting of costs associated with assessing market and business opportunities. This section focuses on the analytical techniques that can be used to ensure profitable investment decisions.

One of the major objectives of all the time, energy, and resources put into a project is to generate a “good” profit. A “good” profit, how-

TABLE 4.5. Variable Cost As a Percent of Sales

Cost category	Fixed cost	Variable cost	Variable cost as a percent of sales (sales = \$70,000)
Raw materials	—	3,100	4.4
Direct labor	—	27,500	39.3
Indirect labor	200	150	0.2
Factory maintenance	100	100	0.1
Utilities	500	400	0.6
Property tax	300	—	—
Depreciation	900	—	—
Sales commissions	—	5,250	7.5
Advertising	—	1,200	1.7
Sales expense	2,200	800	1.1
Administrative salaries	25,000	—	—
Depreciation (office)	750	—	—
Bad debt expense	1,200	—	—
Totals	\$31,150	\$38,500	55.0%

ever, may be a matter of personal judgment. A company should establish certain acceptable levels of return on investment before choosing among project alternatives.

Return on Investment

Simply stated, return on investment (ROI) is how much an investment returns on an annual basis. ROI is the most meaningful and popular measure of economic success. This term is widely understood by accountants, financial analysts, bankers, managers, and investors. ROI analysis is very helpful in determining the health of a project. ROI itself, however, does not measure the safety of an investment, only its performance expressed as a percentage.

Return on investment can be calculated by dividing net profit by the total investment required to generate the profit. The following formula illustrates the calculation of ROI:

$$\begin{aligned} \text{Return on investment (ROI)} &= \frac{\text{Net profit}}{\text{Total investment}} & (4.3) \\ \text{ROI} &= 20.5\% = \frac{\$37,500}{\$182,000} \end{aligned}$$

ROI can be calculated for a wide range of investments including savings accounts, profit centers, divisions, and entire companies. Return on investment can also be expressed as a combination of the profit margin on sales and the turnover activity ratio of an investment:

Net profits divided by sales equals the profit margin:

$$\frac{\text{Net profit}}{\text{Sales}} = \text{Profit margin}$$

Sales divided by investment = Turnover of assets

$$\frac{\text{Sales}}{\text{Investment}} = \text{Turnover}$$

Return on investment is equal to turnover \times profit margin

$$\frac{\text{Net profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Investment}} = \text{ROI}$$

This second approach to determining return on investment brings together the profitability margin on sales and the activity ratio of asset (investment) turnover. This approach to ROI takes into consideration the combination of the efficient use of assets (investments) and the profit margin on sales. This method, known as the DuPont system of financial analysis, has been widely accepted in American industry.

Financial Analysis Process

Financial analysis and capital budgeting consist of the process of selecting among alternative investments in land, buildings, productive equipment, or other assets for future gain. Since decisions of this type usually commit the firm to a long-term course of action, careful analysis is required to identify the potential return.

Capital budgeting is conceptually very simple. Simply list all the investment opportunities available, rank them according to profitability, and accept all investments up to the point at which marginal benefits equal marginal costs. However, in reality, the complexity of revolving planning horizons makes the choice of capital outlays more difficult. Different project length, start-up time, and payout time make meaningful comparisons among investment alternatives problematic.

The depth of the economic analysis needed depends on the type of project, its urgency, and the objectives of the firm. For example, a burned-out generator in a power plant must be replaced. The decision is not replacement versus nonreplacement; the decision concerns only which particular generator is most productive, least costly, or most readily available.

Before discussing in detail the analytical techniques for determining profitability and for making capital decisions, a framework for the decision process should be established.

Step one: Define problem.

Step two: Identify alternatives.

Step three: Identify relevant costs and revenues that will change because of the action taken.

Step four: Determine the alternative that has the most beneficial result.

Step One: Define Problem

The first step appears obvious; however, even though it is elementary, it is often overlooked. Many times a statement of a problem such as “We need more trucks” is not a problem statement at all but, rather, a suggested alternative solution. Too often, decision makers jump prematurely to step two without clearly articulating the problem. The importance of proper problem definition cannot be overemphasized. Replacement of a worn-out piece of equipment, development of a new product, and the construction of a new plant all create uniquely complex problems to overcome. Each of these examples generally produces several alternatives, which must be clearly identified and evaluated.

Step Two: Identify Alternatives

Alternative actions can range from doing nothing to going out of business to replacing with the same type of equipment, replacing with different equipment, replacing with larger or smaller equipment, and so on. From this wide range of alternatives, only the appropriate alternatives should be selected for further analysis.

Step Three: Identify Relevant Costs and Revenues

The next step is to identify the relevant costs and revenues that will change as a result of the action taken. Many aspects of technical analysis and cost forecasting also apply to this step in the capital budgeting process. Do not assume that past operating costs will apply to new ventures. Although it is tempting simply to project historical costs into the future, it is very hazardous to do so. Methods of dealing with the uncertainty surrounding the cost and revenue flows involved in capital budgeting must be incorporated to realistically identify and estimate costs and revenues. These methods will be discussed later.

The basic question asked in step three is, "What are the changes in costs and revenues that will occur because of an action taken?" Other questions to be addressed follow:

What additional revenues will be generated?

What revenues will be lost?

What is the net impact of the action on revenue?

What additional costs will be generated?

What costs will be eliminated?

What is the net impact of the action on costs?

The preceding questions lead to the economic principle of incremental changes in cash flow. Once an after-tax cash flow change has been determined, we are ready for step four.

Step Four: Determine the Alternative with the Most Beneficial Result

The capital budgeting decision alternative with the most positive return on investment is generally considered the superior one. The specific method of analysis used to calculate which alternative has

the most sufficient economic returns over the life of the investment must in some way take into account the trade-off of current cash outlay and future cash inflow.

Methods of Analyzing Investments

Many methods are available to evaluate investment alternatives prior to making the capital budgeting decision. Some of the more common methods will be discussed as follows. The focus of capital budgeting is to make decisions that maximize the value of a firm's investment. Choose a method that will answer most appropriately the question, "Which is the most profitable alternative?" The most common criteria for choosing among alternatives may be identified as nontime value methods and time value methods.

1. Nontime methods
 - a. Payback period
 - b. Simple return on investment
 - c. Average return on investment
2. Time value methods
 - a. Net present value
 - b. Internal rate of return
 - c. Present value index

Each of these methods has advantages and disadvantages which will be discussed along with a description of each method.

Nontime Methods

Payback period. The payback period method is simply an estimate of how long it will take for the investment to pay for itself. No interest factors are included in the calculations. Once the payback period is determined, it is usually compared with a rule-of-thumb or standard period. If it is determined that the investment will pay for itself in less time than the standard period, the investment would be made. In deciding between mutually exclusive alternatives, the one with the shortest payback period is generally chosen.

The payback period can be calculated in several ways. The most common method uses this formula:

$$\text{Payback} = \frac{\text{Net investment outlay}}{\text{Net annual cash flow benefits}} \quad (4.4)$$

When annual cash flow benefits are irregular or investment outlay comes in various time frames, the approach shown in Table 4.6 can be used to determine the payback period. In this case the payback period is four years. The payback period method is widely used because of its ease of calculation. Because it does not take into consideration the time value of money, however, it has serious flaws of logic.

Advantages

1. The calculations are easy.
2. Choosing the project with shortest payback period has the more favorable short-run effect on earnings per share.
3. The method is easily understood.

Disadvantages

1. The method completely ignores all cash flows beyond the payback period.
2. It does not adjust for risk related to uncertainty.
3. It ignores the time value of money.

TABLE 4.6. Calculating the Payback Period

Year	Investment outlay \$	Annual cash flow benefits \$	Cumulative cash flow \$
1	150,000	40,000	(110,000)
2	10,000	40,000	(80,000)
3	0	40,000	(40,000)
4	0	40,000	0
5	0	40,000	40,000
6	0	20,000	60,000
7	0	20,000	80,000

Some firms are beginning to use the payback method in combination with one or more of the time-value methods described as follows. When this is done, the payback method is used as a risk measurement while the time value method is used as an indicator of profitability.

Simple return on investment. The simple return on investment method is an outgrowth of the logic of the payback method. This method can be represented by manipulating the payback formula. This method is an attempt to express the desirability of an investment in terms of a percentage return on the original investment outlay.

$$\text{Return on investment} = \frac{\text{Net annual cash flow benefits}}{\text{Net investment outlay}} \quad (4.5)$$

The simple ROI method has all the drawbacks and disadvantages of the payback method. No reference at all is made to the project's economic life. An investment of \$40,000 with an average annual benefit of \$8,000 will yield a 20 percent return regardless of whether the length of the project is one, five, or ten years.

Another example follows:

$$\text{ROI} = \frac{\$5,000}{\$50,000} = 10\%$$

Average return on investment. The expected average rate of return is a measure of the estimated profitability of an investment. This calculation differs from the simple return on investment by using the average net investment.

$$\text{Average return on investment} = \frac{\text{Net annual cash flow benefits}}{\text{Average net investment outlay}} \quad (4.6)$$

Assuming straight-line depreciation and no residual value at the end of its life, an average investment would be equal to one-half of the original investment. Using the previous example, a net annual cash flow of \$8,000 on an original expenditure of \$40,000 would be 40 percent, not 20 percent.

$$\text{Average ROI} = \frac{\$5,000}{\$25,000} = 20\%$$

Time-Value Methods

Investment decision value involves the trade-off between current dollar outlays and future benefits over a period of time. As a result, it is not prudent to ignore the timing of the benefits of investment alternatives. In this regard, the quicker the return the better. Money has value directly related to the timing of its receipt or disbursement. The delay of receiving money means an opportunity cost in terms of lost income. Thus, it is obviously preferable to receive benefits quickly and defer expenditures.

Net present value method. The basic idea of the net present value (NPV) method is to overcome the disadvantage of nontime value methods. The NPV method provides a balance or trade-off between investment outlays and future benefits in terms of time-adjusted dollars. The present value of discounted cash flows is an amount at present that is equivalent to a project's cash flow for a particular interest rate. Generally, the interest rate used to discount future cash flows is a company's cost of capital rate. The net present value method involves the following:

- Determining the present value of the net investment cost outlay
- Estimating the future cash flow benefits
- Discounting the future cash flows to present value at the appropriate cost of capital
- Subtracting the present value of the costs from the present value of the benefits

If the amount derived from the fourth step is positive, then the investment is considered to be profitable since the time-adjusted internal rate of return of the investment is greater than the cost of capital. Conversely, a negative figure indicates that the project is earning a rate of return less than the cost of capital chosen by the firm as a standard of decision.

Net present value (NPV) can be calculated by the following formula:

$$NPV = \frac{R^1}{(1+i)^1} + \frac{R^2}{(1+i)^2} + \dots + \frac{R^n}{(1+i)^n} - IC \quad (4.7)$$

Where:

- NPV = The net present value of the investment
 R = The expected dollar returns or cash flows each year
 i = The appropriate interest rate (cost of capital)
 IC = The present value of the investment cost
 n = The project's expected life

The net present values of two alternative projects are illustrated in Table 4.7.

Project one has the highest return, even though the payback period is identical. The greatest benefit will be provided by selecting project one. If the two projects are not mutually exclusive and funds are available, both investment opportunities should be accepted.

TABLE 4.7. Value Comparison

Year	Net return or cash flow \$		Interest factor (1 + i) ⁿ	=	PV of cash flow \$	
<i>Project 1</i>						
1	400	×	0.91	=	364	
2	500	×	0.83	=	415	
3	600	×	0.75	=	450	
4	800	×	0.68	=	<u>544</u>	
					1,773	PV of inflows
					<u>-1,500</u>	Less PV of cost
					\$273	Net present value
<i>Project 2</i>						
1	800	×	0.91	=	728	
2	300	×	0.83	=	249	
3	400	×	0.75	=	300	
4	400	×	0.68	=	<u>272</u>	
					1,549	PV of inflows
					<u>-1,500</u>	Less PV of cost
					\$49	Net present value

The present value method has several advantages which make it more suitable than the payback methods as a basis of comparing investments.

Advantages

1. Considers the time value of money.
2. Concentrates the values of costs and benefits in a comparable time frame.
3. Fairly simple to understand and calculate.

Disadvantages

1. Assumes benefits and costs can be estimated for the lifetime of the project.
2. Requires equal time periods for comparison of several investment alternatives.
3. Sensitive to changes in the interest rate used to discount the values.

Internal rate of return. The internal rate of return (IRR) is simply the yield of a project. The IRR is defined as the interest rate that discounts the future cash flows, or receipts, and makes them equal to the initial cost outlay. The time value of money is taken into consideration. The formula used for net present value can also be used for calculating the IRR with one slight variation. Instead of solving for net present value, the present value of the cost is made equal to the present value of the benefits. In other words, the internal rate of return of a project is the discount interest rate that generates a net present value of zero. Below is the NPV formula and the change necessary to create the IRR formula.

NPV formula:

$$NPV = \frac{R^1}{(1+i)^1} + \frac{R^2}{(1+i)^2} + \dots + \frac{R^n}{(1+i)^n} - IC \quad (4.7)$$

IRR formula:

$$\frac{R^1}{(1+i)^1} + \frac{R^2}{(1+i)^2} + \dots + \frac{R^n}{(1+i)^n} = IC \quad (4.8)$$

or

$$0 = \frac{R^1}{(1+i)^1} + \frac{R^2}{(1+i)^2} + \dots + \frac{R^n}{(1+i)^n} - IC$$

Solve for i , and $i = \text{IRR}$.

In the new formula for IRR, i represents the interest rate that equates the present values of the benefits and the costs of a project. In the NPV formula, i represents the firm's cost of capital. If the cost of capital is used in the formula and $NPV = 0$, then the internal rate of return is equal to the cost of capital. When NPV is positive, the IRR is greater than the cost of capital; when NPV is negative, the IRR is less than the cost of capital. If the IRR is greater than the firm's cost of capital, the investment is a positive one. The IRR can be found by trial and error. The IRR method is widely accepted as a ranking device. The yield is reasonably accurate and much superior to the simple pay-back and simple return on investment methods.

Advantages

1. Because the IRR method is closely related to the NPV method, it is familiar to many business practitioners and thus more readily accepted.
2. Calculation of the firm's cost of capital is not required as it is with the NPV method.
3. The method time values money.

Disadvantages

1. The internal rate of return does not do a good job of comparing investments with large differences in magnitude. For example, a \$20,000 investment with an IRR of 42 percent cannot be compared with an investment of \$100,000 with an IRR of 30 percent. It may be far better to direct all resources toward the \$100,000 investment even though the IRR is lower than the other investment.
2. In the same manner, length of the life of the investment is also important. It may be more advantageous to invest funds at a lower IRR for a longer term than to invest short-term for a slightly higher IRR. The pertinent criticism of the IRR method is that it assumes re-investment can be made at the IRR, which may not be true.

Present value index. This method is similar to the present value method. A ratio is determined between the present value of the cash flow benefits and the present values of the net investment outlays or costs. The present value index is sometimes referred to as the benefit/cost ratio of discounted cash flows. Several alternative projects may have similar NPVs but require widely different investment amounts. To choose an alternative based simply on the size of NPV would ignore the relative different sizes of the projects. Equal NPV's coming from different sized investments will have different IRRs. A formal way of expressing this difference is to compare the projects on a benefits/costs basis.

$$\text{Present value index} = \frac{\text{Present value}}{\text{Present value of net investment outlay}} \quad (4.9)$$

The higher the index, the better the project. However, any present value index over 1.0 beats the minimum standard built into the calculation of present value and should be funded. Most projects, however, are competing for limited funds. Table 4.8 compares the PV index and the NPV ranking methods. Slightly different results are shown. Alternatives 1 and 3 have the same NPV, but alternative 1 has the higher PV index and is, therefore, more favorable. The advantages and disadvantages of the PV index method are similar to those listed for the net present value method.

TABLE 4.8. Present Value Index

Alternative	Present value of benefits	–	Present value of costs	=	Net present value	PV index
1	\$10,500		\$8,500		\$2,000	1.24
2	16,000		13,000		3,000	1.23
3	15,000		13,000		2,000	1.15
4	17,500		18,500		–1,000	.95
5	20,000		16,000		4,000	1.25

METHODS OF ANALYZING RISK

The riskiness of an asset is measured by the probability that the future returns will fall below expected levels. This is often measured by the standard deviation or the coefficient of variation of expected returns. In the earlier discussion of the various methods of making capital budget decisions, the only treatment for risk was the informal aspect of making judgments concerning estimates of economic life and cash flow amounts. Some situations, however, call for a more formal assessment of risk and the effect of uncertainty. Sensitivity analysis can be used to calculate a project's NPV under alternative assumptions.

Projects for which the variability in expected returns is very large require an even more formal approach to evaluating risk. Risk analysis attempts to identify the likelihood that events will occur. Risk results from lack of experience, misinterpretation of data, bias in forecasting, errors in analysis, and changes in economic conditions. In the process of project feasibility analysis and assessment, a number of variables are usually in question.

More than seven out of ten companies report that they employ some type of risk assessment in project analysis. Some of the most common risk evaluation techniques are risk-adjusted discount rate or rate of return, risk-adjusted cash flows, and risk-adjusted payback periods.

Risk-Adjusted Discount Rate

One of the most frequently used methods in risk assessment is the risk-adjusted discount rate method. The basic objective of this method is to increase the applied discount rate when dealing with risky projects. (If the simple rate of return method is being used, the cut-off rate is raised to allow for a greater "cushion" for risky projects.) The increase in the discount rate (cost of capital) is a risk premium that protects the firm from the uncertainty of future cash flows of investments.

As mentioned earlier, the variability of the probability distributions of expected returns can be estimated. In some cases, the probability distribution can be estimated objectively with statistical techniques. In many situations, the estimates must be determined by subjective probability distributions. Once the probability distribution

has been determined, the variability of the distribution can be measured using standard deviation or coefficient of variation. The project with the larger deviation represents the greatest risk and is assigned the higher discount rate.

The higher discount rate reduces the present value of the future benefits and makes it more difficult for a risky investment to achieve a positive net present value. Consequently, marginal projects that are more risky will be rejected.

The risk-adjusted discount rate method is easy to apply but it has some disadvantages. Usually, the adjusted rate applies to all costs and revenues, even those that can be estimated with relative certainty. The lack of discrimination among the cost and revenue estimates is the major criticism of this method.

Risk-Adjusted Cash Flows

As forecasts are being made to develop the point estimate or most likely estimate, the analyst will incorporate perceived risk into the estimate. Then, the analyst defines the degree of uncertainty in terms of probability of occurrence. For example, an “optimistic,” “most likely,” and “pessimistic” estimate is made taking historical data, environmental analysis, and expected trends into consideration. This three-level method of forecasting was exhibited earlier in Table 4.2.

Consider the following calculation of the expected value of cash flows from two projects shown in Table 4.9. Table 4.10 shows the calculation of expected value based on the data of Table 4.9.

The expected value of the cash flow of project 1 is \$640 instead of the \$700 point estimate (the highest probability of occurrence), while the expected value of the cash flow of project 2 is \$670 rather than \$900. The expected value gives forecasters and decision makers a better idea of the risk involved in the decision.

The risk-adjusted cash flow is generally lower than the best estimate cash flow. The effect of using a risk-adjusted cash flow in the net present value method of capital budgeting is a lower net present value than would have been obtained by using the best estimate cash flow. The result is that marginal projects with risky potential benefit are more readily discarded.

TABLE 4.9. Probability

State of economy	Probability	Project 1 cash flow \$	Project 2 cash flow \$
Recession	.2	850	350
Normal	.5	700	900
Boom	<u>.3</u>	400	500
	1.0		

TABLE 4.10. Expected Value of Cash Flows

Cash flow \$	Probability of economic condition	Expected value \$
<i>Project 1</i>		
850	.2 Recession	170
700	.5 Normal	350
400	<u>.3 Boom</u>	<u>120</u>
	1.0	640
<i>Project 2</i>		
350	.2 Recession	70
900	.5 Normal	450
500	<u>.3 Boom</u>	<u>150</u>
	1.0	670

SIMULATION MODELS

Computer simulation can be used to extend probability concepts in decision making. This allows decision makers to estimate, for each of a dozen or so variables of major products, ranges of possible outcomes and the probability distributions for these ranges. The focus might be placed on sales volume, prices, key cost elements, salvage values, interest rate fluctuations, or cash flows. A series of outcomes for the project is then developed using the computer simulation. The computer output allows statements to be made, such as, "There is a 65 percent likelihood that the net present value of the project will be \$200,000" or "There is a one in ten chance that the project will lose

\$210,000.” The sophistication of this type of analysis and the limitless number of variables places obvious limitations on its use.

NOT-FOR-PROFIT COST ANALYSIS

Cost analysis for not-for-profit organizations is difficult. When a nonprofit organization is choosing between alternative programs that fall within the scope of its objectives, benefit/cost analysis can be helpful. Benefit/cost analysis is a formalized attempt to obtain the maximum benefits from a given level of funding. For example, a community wants the best possible police protection, a university wants the best faculty, the Red Cross wants the most effective blood donor recruiting program that the given level of funding can support. Benefit/cost analysis allows nonprofit organizations to evaluate various alternatives.

In this analysis, each program can be evaluated based on a comparison of benefit/cost ratios. For example, a public library may be considering the addition of a new business section, a film rental library, or an arts library. These alternatives are illustrated in Table 4.11. Alternative one and two have a positive net benefit, and a benefit/cost ratio greater than one. Alternative two has the most favorable benefit/cost ratio. However, if the library has approximately \$80,000 available, it should embark on both alternatives. Alternative three fails both the net benefit test and the benefit/cost ratio test. Unless other overriding nonfinancial considerations exist, alternative three should be rejected. The basic disadvantage of this type of analysis is the difficulty of estimating both costs and benefits. Costs are perhaps the easiest part of the equation. Cost of construction, equipment, supplies, salaries, and so forth, can usually be accurately estimated. Social costs are more difficult to appraise. On the other hand, benefit analysis poses many difficult problems. As we attempt to identify

TABLE 4.11. Benefit/Cost Ratio Analysis

Alternative	Benefits \$	Costs \$	Net benefit \$	Benefits/costs ratio
1	32,500	28,400	4,100	1.14
2	48,000	40,000	8,000	1.20
3	17,700	22,800	(5,100)	.78

each type of benefit, we run into some social, aesthetic, and non-monetary benefits. How these are assigned dollar values radically influences the benefit/cost analysis.

When difficulty occurs in comparing alternatives on the benefit/cost basis, cost effectiveness analysis may be appropriate. Cost effectiveness analysis deals with the effect of variations in cost on benefit. The focus of this analysis is to determine effectiveness of operations rather than trying to see how much more benefit there is than cost.

SUMMARY

Accurately estimating the financial impact of a decision is extremely difficult. There are many unknowns and contingencies which cause forecasts to vary from actual revenues. Nonetheless, the revenue forecast is a basic prerequisite to complete financial analysis. Overly optimistic forecasts produce unrealistic expectations, whereas overly pessimistic predictions may lead a firm to pass up a good opportunity.

Accurate cost estimation is also extremely important to opportunity assessment. Cost overruns are common and often disastrous to the principals involved in a venture. Consequently, every attempt should be made to identify and estimate accurately all costs associated with a specific opportunity. This is best accomplished by a thorough technical study and an accompanying cost forecast. The results of the forecasting process should yield a project cost summary that can be used in determining return on investment.

The final consideration of the overall financial analysis is "How profitable will the project be?" The concept of return on investment is essential to answering this question. Hopefully, the analysis will lead to a clear "yes" or "no." In some cases, however, an "I don't know" will be the response.

To answer the question "yes" implies that the market exists, costs are identifiable and controllable, the process or service works, the financial returns on the investment are satisfactory, and the uncertainty is tolerable. In other words, the overall opportunity assessment has determined that the project is both feasible and profitable.