CHAPTER

11

Profit Center Analysis

In this chapter you learn to analyze the profitability of different parts of the company and identify where the company needs to make changes to improve profitability. You will learn to select between hiring a subcontractor and self-performing work. You will also learn to monitor the profitability of different customers and identify which customers should be developed and which customers your company would be better off without.

It is important for financial managers to identify where the company's profit is generated. This would be easy if all activities produced the same gross profit margin. This, however, is not the case. Profit center analysis is where management looks at different activities of the company as profit centers that generate company's profits. Profit center analysis helps management determine if certain activities of the company are meeting its goals, identifies places for change, and provides a quantitative analysis that helps management make decisions, such as whether the company will self-perform work or subcontract the work out to other companies. Before profits can be allocated to different activities we must understand two things. First, we must understand the sources of profit on the company's core business: building construction projects. Second, we must understand how to allocate the general overhead costs to the different profit centers. Let's look at the sources of profit.

Sources of Profit

There are up to four sources of profit on a construction project. They are as follows: minimum profit and overhead markup required by the company, profit from the bidding and buyout process, profit from individual crews, and profit from project management. For profit calculation to be accurate, the budget must be a realistic estimate of the cost to complete the project. Budgets that are fat, have large contingencies, are missing items, or have underestimated costs distort the profit analysis. It is important that budgets are carefully and accurately prepared.

The first source of profit is the minimum profit and overhead markup. Each company should establish a minimum profit and overhead markup that each project needs to meet to make it worthwhile for the company to construct the project. The profit and overhead markup, including marking up labor and equipment, may be different for different cost categories—materials, labor, subcontract, equipment, and other. This profit and overhead markup is used to cover the costs of the general overhead and provide a minimum profit for the company's shareholders. Chapter 10 discussed how to determine the minimum profit and overhead markup. The profit from the minimum profit and overhead markup is easily determined by multiplying the project budget by the minimum profit and overhead markup using the following equation:

$$\text{Profit}_{\text{Min}} = \text{Budget}(\text{Profit and Overhead Markup}) \tag{11-1}$$

If the profit and overhead markup was different for each cost category, the profit for each cost category would be calculated and the profit from the categories would be added together.

Example 11-1: Your company bid a project for $1,000,000 that had a budget of $820,000. The company's minimum profit and overhead markup is 15% for all cost categories. What is the profit generated from the profit and overhead markup?

Solution: The profit is calculated using Eq. (11-1) as follows:

$$\text{Profit}_{\text{Min}} = \$820{,}000(0.15) = \$123{,}000$$

The second source of profit or loss is profit or loss generated during the bidding and buyout process by the estimator. The title of estimator is used to describe the person who prepares the estimate regardless of his or her job title. This is profit in addition to the minimum profit and overhead markup and is a result of skillful bidding, subcontracting, and purchasing by the estimator. One way to increase the markup is to identify those times when the market will allow contractors to charge higher than normal prices for their work. The tracking of competitors' bidding habits was discussed at the end of Chapter 10 as a way to help the company determine when this opportunity exists. Another way is to reduce construction costs while maintaining prices to the project's owners. This may be done by getting price concessions from suppliers and subcontractors or finding cheaper sources for materials and subcontract work. The markup may also be increased by decreasing costs faster than prices are decreased.

The profit generated by the bidding and buyout process equals the price charged the owner—which is the bid accepted by the owner or the contract amount with the owner—less the budget for the project less the minimum profit and overhead markup. This profit is calculated by the following equation:

$$\text{Profit}_{\text{Est}} = \text{Price} - \text{Budget} - \text{Profit}_{\text{Min}} \tag{11-2}$$

Conversely, if the estimator does a poor job during the bidding and buyout process there could be a loss instead of a profit. A loss occurs any time that the bidding and buyout process fails to include enough profit to exceed the minimum profit and overhead markup. This may occur because of bidding the job too cheaply, poor estimation of costs, or error in the estimate.

Example 11-2: Determine the profit from the bidding and buyout process for Example 11-1.

Solution: The profit is calculated using Eq. (11-2) as follows:

$$\text{Profit}_{\text{Est}} = \$1{,}000{,}000 - \$820{,}000 - \$123{,}000 = \$57{,}000$$

The third source of profit is profit from the management of labor and equipment by the crew's foreperson. Equipment is included as part of the crews when the equipment is used and managed by the crews. The profit earned by the foreperson as part of management of the crews is the difference between the budget for the work performed by the crew and the cost to perform the work. This profit is calculated using the following equation:

$$\text{Profit}_{\text{Crew}} = \text{Budget} - \text{Cost} \tag{11-3}$$

The profit earned by the management of the crews is a function of two factors: the number of hours—labor and equipment—it takes to complete the task and the hourly rates for the labor and equipment. Profit occurs when the work is managed in such a way that the workers are productive and the proper class of employees is assigned to each task. Conversely, if the foreperson poorly manages the labor and equipment a loss can occur. This may be due to poor scheduling so that the task takes more hours to complete than it should or because the hourly costs were higher than were needed due to using the wrong class of workers to complete the work.

Example 11-3: Your company's excavation crew completed the excavation work on the project in Example 11-1 for $125,000. The budget for this item is $130,000. What is the profit that resulted because of good management on the part of the foreperson?

Solution: The profit is calculated using Eq. (11-3) as follows:

$$\text{Profit}_{\text{Crew}} = \text{Budget} - \text{Cost} = \$130{,}000 - \$125{,}000 = \$5{,}000$$

The fourth and final source of profit is profit from management of the project. Equipment is included as part of the management of the project when the equipment is used by the entire project and is managed by the project's management team. The profit earned by the project's management team is the difference between the budget and the cost for the entire project, except for the work performed by the crews, and is calculated using the following equation:

$$\text{Profit}_{\text{Mgt}} = \text{Budget} - \text{Cost} \tag{11-4}$$

Profit can be generated by good project management in the form of controlling material waste and reducing overhead costs. One way to reduce overhead costs is to reduce the duration of the project. On the other hand, poor management can reduce profit by poor scheduling and excessive material waste.

Example 11-4: Your company completed the project in Example 11-1 for $812,000, of which $125,000 was performed by in-house crews. The budgeted cost for the in-house work was $130,000. What is the profit from the management of the project?

Solution: The budgeted cost for the work—excluding the work performed by in-house crews—is $690,000 ($820,000 − $130,000). The cost for the work—excluding the work performed by in-house crews—is $687,000 ($812,000 − $125,000). The profit from the project management is determined using Eq. (11-4) as follows:

$$\text{Profit}_{\text{Mgt}} = \text{Budget} - \text{Cost} = \$690{,}000 - \$687{,}000 = \$3{,}000$$

The total profit on the project in Examples 11-1 through 11-4 is $188,000 ($1,000,000 − $812,000). Of this, $123,000 is from the profit and overhead markup, $57,000 is from good estimating practices, $5,000 is from good management of the excavation crew, and $3,000 is from good project management. When properly calculated, the total of the profit and overhead markup required by the company, profit from the bidding and buyout process, profit from the individual crews, and profit from project management should equal the total profit on the project.

The project's management can affect the cost to perform in-house work by poor scheduling, among other things. In order for profit center analysis to work, the in-house crews must be treated and act as subcontractors to the project. When poor coordination on the part of the project's management increases the time needed to complete the task or their costs, the crew's management should be discussing these issues with the project's management. Just as subcontractors request a change order when the scope of work changes, the in-house crews should request change orders. If the project's management is not responsible for the costs of the in-house crews and the crews are not treated as subcontractors, the crew can become a source of funds that the project's management team can tap without being held accountable for the use of the funds.

Example 11-5: Your company completed building a garage for the Winstons. The costs are shown in Figure 11-1. The work in the grading and excavation, landscaping, roofing, and overhead door cost categories was done by subcontractors. All concrete labor was performed by the company's concrete crew and the framing was done by the company's framing crew. The company's minimum profit and overhead markup is 20%. Determine the profit generated by the estimator, project management, the concrete crew, and the framing crew on this project.

Job: 408 Winston Garage — August 21, 2004

Code	Description	Contract Amount	Billed to Date	Costs: Actual	Costs: Budget	Costs: Overrun
1000	General Conditions			3,275	3,400	−125
2100	Grading and Excavation			2,000	1,900	100
2700	Landscape			152	200	−48
3300	Footing and Found.-Labor			462	450	12
3400	Footing and Found.-Concrete			475	550	−75
3500	Slab/Floor-Labor			395	400	−5
3600	Slab/Floor-Concrete			1,964	2,000	−36
3900	Rebar			225	200	25
6110	Rough Carpentry			1,522	1,700	−178
6120	Lumber			2,257	2,200	57
7500	Roofing			850	850	0
8110	Metal Doors and Frames			243	250	−7
8300	Overhead Door			392	400	−8
9800	Paint			700	700	0
	Job Total	20,000	20,000	14,912	15,200	−288

FIGURE 11-1 Costs for Winston Garage

Solution: The minimum profit and overhead for the project is calculated using Eq. (11-1) as follows:

$$\text{Profit}_{\text{Min}} = \$15{,}200(0.20) = \$3{,}040$$

The profit generated by the estimator is calculated using Eq. (11-2) as follows:

$$\text{Profit}_{\text{Est}} = \$20{,}000 - \$15{,}200 - \$3{,}040 = \$1{,}760$$

In Figure 11-1, the difference between the actual costs and the budget costs is recorded as a cost overrun, with positive numbers indicating a cost overrun or a loss and negative numbers indicating a cost savings. The profit earned by the concrete crew is the cost savings for the footings and foundation labor and the slab/floor labor or a loss of \$7 (−5 + 12). The profit earned by the framing crew is the cost saving for the rough carpentry or a profit of \$178. The profit earned by the project management is the cost savings on the remaining items or a profit of \$117 (\$288 − \$178 + \$7). The total profit on the project is \$5,088 (\$20,000 − \$14,912). The sum of the profits is \$5,088 [\$3,040 + \$1,760 + (−\$7) + \$178 + \$117].

ALLOCATION OF GENERAL OVERHEAD

Often in a profit center analysis the general overhead needs to be allocated to the profit centers. Because we are dealing with profits, the overhead that should be allocated is the overhead budget or costs based on profits rather than cash flows (see Chapter 9). There are a number of methods for allocating general overhead.

When allocating the general overhead each account of the general overhead should be allocated separately using the method that is most appropriate for that account. Let's look at the different methods.

The first method is to allocate the general overhead based on the percentage of a company's revenue generated by the profit center. The underlying assumption is that there is a relationship between the amount of revenue generated by a profit center and the amount of general overhead resources that the profit center uses. This is not always the case. For example, profit centers that rely heavily on in-house labor often use more of the general overhead than profit centers that rely heavily on a few subcontractors.

The second method is to allocate the general overhead based on the labor costs or labor hours for each profit center. In the days before computerized accounting packages, the labor burden for project labor was not charged to the jobs but was included as a general overhead item and then allocated to the jobs based on the labor costs or labor hours of each job. This was done because the calculations needed to charge the costs to the jobs are complex and time consuming. With the advent and use of computerized construction accounting systems, the computer can effortlessly perform these calculations, allowing companies to track labor burden costs as construction costs rather than treating them as general overhead costs. Currently, all labor burden for labor performed on the projects should be charged to the projects. Where possible, general management labor costs should be charged to the project on which the crews they manage spend their time. For example, in the case where all of the in-house crews report to a company manager who spends all of his or her time managing the crews—assigning the crews to the various projects and seeing that they have the necessary materials and personnel—the manager should track the time he or she spends supporting each crew so his or her time can be billed as part of the crew costs. This is not always possible, but when possible it should be done because it gives a more accurate picture of the cost of performing the work in-house. When this is not possible, allocating the cost based on labor costs or labor hours is the next best method. Another place this method is commonly used is when allocating unallocated labor—labor for field employees that cannot be charged to a job. This occurs when employees are paid for traveling between projects.

The third method is to allocate the general overhead based on the material costs for each profit center. This method is used when there is a relationship between general overhead costs and the use of materials. This method is commonly used when allocating general overhead costs associated with maintaining an inventory and includes such items as unallocated materials, storage costs, delivery costs not charged to jobs, and the labor costs associated with maintaining an inventory.

The fourth method is to allocate the general overhead based on the estimated usage of the general overhead by the profit center. Here management makes a judgment call as to how much of the general overhead was used by each profit center.

The fifth method is to determine the incremental general overhead cost of each of the profit centers with remaining costs being assigned to the core profit center. Many construction companies consist of a core business—say, general contracting—and then have a number of small profit centers that have been

created to support the core business—such as an excavation or framing crew. In this method the general overhead costs are allocated based on the increases in the general overhead costs that are associated with the existence of the individual profit center. This method is useful when determining if a profit center is to be eliminated. When determining the incremental general overhead that is associated with each profit center, the manager determines how much general overhead would be eliminated if the profit center were eliminated. In Chapter 9, it was determined that general overhead costs might be fixed over a certain range. If the changes as a result of the profit center are not significant enough to move the company out of the range the fixed overhead costs remains the same. For example, a framing crew requires 10% of the payroll clerk's time. If by eliminating the framing crew the company is unable to reduce the number of hours the clerk works, the incremental cost of the clerk is zero. If by eliminating the framing crew the company could eliminate the two hours of overtime the clerk worked each week, the incremental cost of the clerk would be the cost of the two hours of overtime. All general overhead costs not allocated as incremental costs are allocated to the core business. This is because the core business is the primary reason the company exists, which if it were eliminated would likely be the end of the company.

The final method is an arbitrary assignment of general overhead costs to the profit centers. Here the costs are allocated using some method where there is not a relationship between the costs allocated to the profit centers and the profit centers use of the general overhead resources. For example, management might decide to allocate general overhead costs based on the profit centers ability to pay the costs, thus using the more profitable profit centers to subsidize the less profitable profit centers.

Example 11-6: A company has two divisions. The first division consists of project management and generated $4,523,367 of revenue during the year. The second division consists of three framing crews that generated $1,080,238 in revenues during the year. Management has decided to allocate the office overhead of $562,256 based on the percentage of the company's revenues generated by each of the profit centers, with one exception—$8,264 of unallocated labor that will be allocated entirely to the second division. Determine the overhead allocated to each of the divisions.

Solution: Of the overhead, $553,992 ($562,256 − $8,264) will be allocated based on percentage of revenues. The total revenues for the company are $5,603,605 ($4,523,367 + $1,080,238) for the year. The general overhead allocated to the first division is calculated as follows:

$$\text{Overhead} = \$553{,}992(\$4{,}523{,}367/\$5{,}603{,}605) = \$447{,}196$$

The general overhead allocated to the second division is calculated as follows:

$$\text{Overhead} = \$553{,}992(\$1{,}080{,}238/\$5{,}603{,}605) + \$8{,}264$$
$$\text{Overhead} = \$115{,}060$$

Profit Center Analysis

Previously, we saw that the profit from a project may be divided up into the profit from the minimum profit and overhead markup, profit from the bidding and buyout process, profit from the management of crews, and profit from the management of the project. By doing this for all of the projects and totaling the profit, the profit from operations may be used to measure the successfulness of the estimator, each crew, and each project management team. There are two additional ways of dividing the profit from operations: by project type and by customer type. Additionally, management can look at the profitability of each piece of heavy equipment.

One of the important duties of management is to hold the managers or supervisors of the profit centers accountable for the profitability of their profit center. Before they can be held accountable for the profitability of their profit centers they need to be given the authority and resources necessary to succeed. Without the authority to make decisions or if their decisions are constantly being overturned by upper management, the managers of the profit center are simply carrying out orders from upper management and cannot be held accountable for the decisions made by upper management. For the profit center managers to be held accountable, they must have the authority to make decisions and fail—within reasonable limits—because success cannot exist unless there is the possibility of failure. Additionally, without the necessary resources—which include the proper training and support from the main office—managers cannot be held accountable for the operation of the profit center. This does not mean upper management does not set limits on the authority and resources available to the managers of the profit centers, but rather that when those reasonable limits have been established upper management allows the profit center managers to operate within those limits. Neither does it mean that once the limits have been set that upper management can ignore the profit center managers. Upper management must be available to help teach, train, and guide the managers to success without interfering with the managers' ability to operate their profit center.

When supervising the managers of the profit centers it is important to remember that what gets measured and rewarded is what gets done. If the profit center managers are only rewarded for meeting the schedule, they will have little incentive to meet profitability and quality objectives. When evaluating profit centers management should look at three areas: schedule, quality, and financial performance. Let's look at how management may evaluate different profit centers.

Crews as Profit Centers

Crews as profit centers may be evaluated against a company standard or against the cost of replacing the crew with a subcontractor.

When comparing crews to a company standard, the performance of a crew may be determined by comparing their performance to the performance of other crews. For example, it is very easy to compare one framing crew to the other

framing crews, especially when they are framing similar types of buildings. Alternately, they may be compared to a minimum standard that applies to the whole company or to an individual goal for each crew. For example, one crew may have the goal to increase their profitability by 10%, whereas another crew may have the goal to operate at a profit rather than a loss. When measuring performance management must look at scheduling, quality, and financial performance.

Schedule performance may be measured by determining the success rate in meeting scheduled milestones. For crews that work on a single project for a long time, it is also useful to measure their schedule performance index (see Chapter 7) at regular intervals (say, at the end of every week) and determine the average schedule performance index for a set period of time (say, the quarter) as a measure of the ability to stay on schedule between the milestones.

Quality performance may be measured by performing standardized quality inspections and by using the results of these inspections to determine how the crew did compared to a set standard. For example, a crew may be evaluated against a standard checklist, where the number of noncomplying items are measured. Care must be taken to ensure that there is consistence in how the noncomplying items are handled. For example, are multiple defects in the drywall throughout a room or building counted as an individual item or is each defect counted as an item? Additionally, the items may be weighted based on their importance. It is important that the quality standard is based on the expected quality of the customers. For example, there would be a higher quality standard for a high-end, custom home than there would be for entry-level housing.

Financial performance may be measured against the budget, which is used to determine the profit for the crew. Once these three performance measurements have been taken they may be compared to the performance measurement of other crews, to a set standard, or to set a goal for the crew.

Crews should be compared to costs to subcontract the work out to determine if it is cost effective to continue using the crew or if the company would be better off subcontracting the work out. This decision should be reviewed periodically—quarterly or annually—for each crew.

Management must look at schedule, quality, and financial performance when comparing in-house crews to subcontracting the work out. It may be wise to pay more to perform the work in-house—thereby sacrificing financial performance—for improved schedule and quality performance. Improved schedule performance may reduce the duration of the project and the associated reduction in the project overhead may offset some or all of the extra cost of performing the work in-house. Improved schedule and quality performance may translate into higher customer satisfaction and may result in more work from the client. Additionally, management must determine if having the extra personnel on staff is worth the effort. Saving a few dollars a month for the same schedule and quality performance may not be worth the time it takes management to support the crews.

The schedule and quality performance is measured as discussed above. When comparing crews to subcontracting the work out, the profit on labor is the difference between the fair market value of the labor and the cost of performing

the labor in-house rather than the difference between the budget and the costs. The fair market value of the labor is the cost at which the work could be subcontracted out and should include all costs that would be born by a subcontractor. For example, if a framing subcontractor typically provides the labor (including labor burden), nails and fasteners, hand tools, and the forklift to frame a building, all of these costs should be included in the cost of in-house framing crews. The reason that rough carpentry is separate from lumber in the cost codes shown in Figure 2-6 is so that all costs that would be born by a framing subcontract can be recorded to 06110 Rough Carpentry, including materials such as nails and fasteners, whereas all costs borne by the general contractor for materials can be recorded to 06120 Lumber. The same is true for 02610 Site Concrete Labor, 03300 Footings and Foundation Labor, and 03500 Slab/Floor Labor, which are used to record the costs of in-house crews. This makes it easy to make a comparison between the rates for in-house crews and the market for the work. When determining the fair market value, all change orders should be included.

Evaluating the crew is important not only so that management can hold the supervisor accountable or determine if the crew should continue to exist but also to know the strength and weakness of each crew so that the most appropriate crew can be assigned to the projects. For example, management would like the crews with the strongest scheduling performance to work on the most time-sensitive projects. In addition, when management knows the weaknesses of each of the crew it knows where more teaching and training would be most beneficial and where corrective action is needed.

Project Management as Profit Centers

Project management teams may be evaluated by comparing their performance to other project management teams, a minimum standard, or to an individual goal for the team. Evaluations must include scheduling, quality, and financial performance. The management team's scheduling, quality, and financial performance may be measured in the same way that the crews' performance was measured. This performance may be measured on a single job or a group of jobs occurring over a period of time. Additionally, its performance should include some measurement of the customers' satisfaction with the management team's performance in these three areas. The customers' satisfaction with the scheduling performance should include items such as how well the management team met turnover dates, how quickly the punch list was completed, and how well the team coordinated with the owners' representatives when dealing with change orders, owner submittals, owner-supplied equipment, and so forth. The customers' satisfaction with the quality performance should include whether the project's quality met the customers' expectations and how the management team handled quality problems. Finally, the customers' satisfaction with the financial performance of the team should include the following: Were change orders handled fairly? Was the billing fair and accurate? And for contracts without a fixed price,

was the budget met? Like evaluating the crew, evaluating management teams is important so that management can get the most appropriate crew assigned to the projects, identify areas where more training is needed, and take corrective action.

Estimators as Profit Centers

Estimators are a source of profit or loss within a company. Estimators should be rewarded for the profit that they generate, with estimators who consistently generate above-average profits rewarded more than those who do not. However, if their performance is measured based only on profit, profit will come at the sacrifice of schedule and quality. The cheapest subcontractors and suppliers will be chosen without regard to their ability to meet the schedule and desired levels of quality. Remember, what gets measured and rewarded is what gets done. Estimators' performance should also be determined by their performance in finding subcontractors and suppliers who understand, are committed to, and are contractually tied to scheduling and quality standards required for the project. Evaluating estimators is important so that management can get the most appropriate estimator assigned to the projects, identify areas where more training is needed, and take corrective action.

Types of Jobs as Profit Centers

In Chapter 10 we saw that one way to increase profitability is to specialize in certain areas of the construction market. To identify those areas of the market that are more profitable and to monitor the profitability of the company's different market segments, each area of specialization may be treated as a profit center. When treating types of jobs as profit centers, jobs that have a similar set of characteristics are grouped together and the profitability for the group of jobs is calculated. Jobs may be grouped by one or more of the following characteristics: similar customer base (such as residential customers), similar use (such as manufacturing), similar types of buildings (such as Type V wood framed buildings), similar location (such as a city or state), and so forth. When grouping the jobs into profit centers, management must make sure that the types are similar. For example, building apartments and building condominiums are very different types of jobs even though they may be built from virtually identical plans and in the same area of a city. This is because their customers and their uses are very different. With apartments there is a single customer—the owner of the apartments—who wants to rent the apartments for business income. Whereas with condominiums there are multiple owners, many of whom have been saving for years to fulfill the dream of home ownership. When grouping jobs by type, the groups often cross management team boundaries and include jobs from more than one team. The groups may not include all of the jobs performed by one team, unless separate divisions or teams have been established for each type of project.

Once the groups have been established the profitability may be calculated for each group and compared to other project groups, a minimum standard that

applies to the whole company or to a target level for the individual group. This comparison may be based on one of the following methods:

First, the comparison may be made based on the actual gross profit margin or the actual profit and overhead markup at the completion of the projects. Because the gross profit margin and the profit and overhead markup are mathematically related, either method may be used. The gross profit margin compares the gross profit to the revenue from the project (the cost of the project to the owner), whereas the profit and overhead markup compares the gross profit to the construction costs of the project. The comparison should be based on the revenue and gross profit for projects over a specified period of time. Completed projects and in-progress projects—where the revenues (or costs) and gross profit can accurately be estimated—should be included in this analysis. By using this comparison, management may find that it obtains a higher gross profit margin on one type of project and as a result it wants to place a greater focus on obtaining the type of project that has the higher gross margin.

Example 11-7: Your company worked on the projects shown in Table 11-1 during the last year.

The duration in Table 11-1 represents the number of months during the year that the project was under construction. Analyze the different profit centers based on their gross profit margins.

Solution: The gross profit and revenue for the apartment profit center is as follows:

$$\text{Gross Profit} = \$153{,}000 + \$110{,}000 + \$75{,}000 = \$338{,}000$$
$$\text{Revenue} = \$3{,}000{,}000 + \$2{,}017{,}000 + \$1{,}542{,}000$$
$$\text{Revenue} = \$6{,}559{,}000$$

The gross profit margin is calculated using Eq. (6-17) as follows:

$$\text{Gross Profit Margin} = \$338{,}000/\$6{,}559{,}000 = 0.0515 \text{ or } 5.15\%$$

TABLE 11-1 Work Performed During the Year

PROFIT CENTER	REVENUE ($)	GROSS PROFIT ($)	AVERAGE MONTHLY INVESTMENT ($)	DURATION MONTHS
Apartment	3,000,000	153,000	187,000	8
Apartment	2,017,000	110,000	183,000	11
Apartment	1,542,000	75,000	108,000	5
Condo	642,000	51,000	88,000	7
Condo	1,600,000	110,000	160,000	10

The gross profit margin for the condominium profit center is calculated in the same manner:

$$\text{Gross Profit} = \$51{,}000 + \$110{,}000 = \$161{,}000$$
$$\text{Revenue} = \$642{,}000 + \$1{,}600{,}000 = \$2{,}242{,}000$$
$$\text{Gross Profit Margin} = \$161{,}000/\$2{,}242{,}000 = 0.0718 \text{ or } 7.18\%$$

Based on the gross profit margin, the condominium projects are more profitable.

Second, the comparison may be made based on the return on the cash invested in the projects constructed by the profit centers. By using this comparison, management may find that certain types of projects have a lower return on investment even though they have a higher than average gross profit margin because the projects require more cash investment. This may be due to slow payments from the owners, owners who require a higher retention rate, or that the projects use fewer subcontractors. As a result, management may want to increase the profit and overhead markup for this group of projects. The return on investment for the profit center may be estimated by dividing the profit for a specified period of time—often a year—by the average investment in the jobs that make up that profit center for that same period of time.

Example 11-8: Analyze the different profit centers in Table 11-1 based on their return on cash invested in the projects.

Solution: From Example 11-7, the sum of the gross profit for the apartment profit center is $338,000. The average investment for the apartment profit center is the weighted average of the average monthly investments in each of the projects. For example, the average monthly investment for the first project is only invested eight months of the year during the time it was under construction. The average monthly investment for the apartment profit center is as follows:

$$\text{Investment} = \$187{,}000(8/12) + \$183{,}000(11/12) + \$108{,}000(5/12)$$
$$\text{Investment} = \$337{,}417$$

The return on cash investment in the apartment profit center projects is as follows:

$$\text{Return} = \$338{,}000/\$337{,}417 = 1.0017 \text{ or } 100.17\%$$

The average monthly investment and the return on cash investment in the condominium profit center projects are as follows:

$$\text{Investment} = \$88{,}000(7/12) + \$160{,}000(10/12) = \$184{,}667$$
$$\text{Return} = \$161{,}000/\$184{,}667 = 0.8718 \text{ or } 87.18\%$$

Based on the return on cash invested in the apartment projects, they are more profitable. It is important to note that this return ignores general overhead, which will greatly reduce the return for the company.

Finally, the comparison may be made based on the amount of management time the project consumes. Management's time is a limited resource that limits the number of jobs that a company can perform. If projects consume more of management's time than is available, then additional management must be hired, increasing the cost of general overhead. If additional management is not hired, the effectiveness of existing management is reduced, resulting in higher cost due to poor cost control. By looking at this comparison, management may determine if they could earn more profit by focusing on obtaining projects that do not consume a lot of management's time or if they should increase the profit and overhead markup on projects that require a lot of management's time. This calculation is done by determining the expected profit that a management team will achieve running at full capacity.

Example 11-9: Analyze the different profit centers in Table 11-1 based on their use of management's time. One project manager can oversee four apartment projects or two condominium projects.

Solution: The monthly profit generated by each apartment project is as follows:

$$\text{Profit}_1 = \$153{,}000/8 = \$19{,}125$$
$$\text{Profit}_2 = \$110{,}000/11 = \$10{,}000$$
$$\text{Profit}_3 = \$75{,}000/5 = \$15{,}000$$

The average monthly profit generated by an apartment project is as follows:

$$\text{Profit} = (\$19{,}125 + \$10{,}000 + \$15{,}000)/3 = \$14{,}708$$

On average an apartment project takes 25% of a project manager's time. Running at full capacity a project manager would generate the following profit per month:

$$\text{Profit} = \$14{,}708/0.25 = \$58{,}832$$

The monthly profit generated by each condominium project is as follows:

$$\text{Profit}_1 = \$51{,}000/7 = \$7{,}286$$
$$\text{Profit}_2 = \$110{,}000/10 = \$11{,}000$$

The average monthly profit generated by a condominium project is as follows:

$$\text{Profit} = (\$7{,}286 + \$11{,}000)/2 = \$9{,}143$$

On average a condominium project takes 50% of a project manager's time. Running at full capacity a project manager would generate the following profit per month:

$$\text{Profit} = \$9{,}143/0.50 = \$25{,}618$$

Based on the use of management's time the apartment projects are more profitable. Each project manager can generate more than twice as much profit when working on apartment projects versus condominiums.

From Examples 11-7 through 11-9 we can see that apartment projects generated more profits based on the limited resources of cash and management's time even though the condominium projects had a higher gross profit margin. In an environment where there is a surplus of projects to build and limited amount of management personnel, the company should focus on building apartments. The company may want to focus on getting additional apartment projects because of their profitability; however, focusing on apartments must be weighed against the risk associated with only operating in one area of the market. Alternately, the company may want to increase its gross profit margin on condominium projects.

Customers as Profit Centers

Each customer should be treated as a profit center. To do this management needs to determine the volume and profit attributed to each customer. Once the data have been collected, the customers are plotted on the matrix as shown in Figure 11-2.

Customers in Quadrant I are the company's best customers. They provide a high volume of work at a high profit margin. In short, they are the company's most profitable customers. Where possible, the company should try to expand the volume of work performed for their existing Quadrant I customers. The company should take precautions to ensure that these customers' needs are being met and that these customers have no reason to take their business elsewhere.

Customers in Quadrant II are customers who provide an occasional job at a high profit margin. Where possible, the company should try to increase the business of these customers. An occasional high-profit job can be a nice bonus. High-maintenance customers in this quadrant may require more of the company's general overhead than it generates in profit or they require so much of management's time

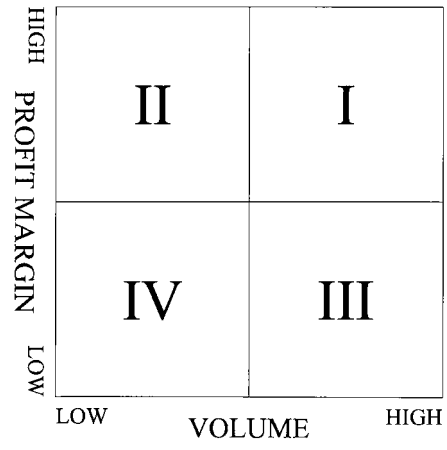

FIGURE 11-2 Customer Matrix

that they do not have time to service Quadrant I customers and develop other customers. When this happens, management must increase the profitability of the customers, convert them into low-maintenance customers, or get rid of the customers. When customers are so high maintenance that they prevent management from taking care of the Quadrant I customers, management must choose if they want to keep the high-maintenance customers and risk losing their Quadrant I customers or get rid of the high-maintenance customers and focus on their Quadrant I customers. The best way to get rid of customers is to pass them along to another contractor who may be in a position to meet their needs while making a profit.

Customers in Quadrant III are customers who provide a steady flow of work at a low gross profit margin. A lot of profit can be generated by customers in this quadrant provided the customers are low maintenance. Where possible, the company should try to increase the profit margin provided by customers in this quadrant by increasing the price to these customers or reducing the cost. The risk that the company takes by increasing the profit margin is that these customers may take some or all of their business elsewhere, which must be weighed against the increased profit margin. The company may find that it is better off taking fewer selective jobs from customers at a higher gross profit margin than it is trying to do all of the customers' work. This is especially true when customers require many different types of work, some of which are outside the company's area of specialization. However, just like the Quadrant II customers, if customers in this quadrant distract the company's focus from serving the Quadrant I customers or if they are high-maintenance customers, the company should consider getting rid of them.

Customers in Quadrant IV should be moved into one of the other quadrants or dropped. It is not uncommon to buy a customer's business—bid the work at a low profit margin—when trying to establish a relationship with the customer. As soon as possible these customers should be moved to another quadrant; otherwise, they will distract management from taking care of the customers in the other quadrants. Some customers are habitual Quadrant IV customers, running from company to company based on who has the best prices. No company can survive on Quadrant IV customers.

Elimination of a few customers who are less profitable or too high maintenance may allow management the time and resources to develop one customer into a customer that produces more profit than the eliminated customers. It is better to be small and highly profitable than large and marginally profitable. It is not uncommon for a small company to double and triple in size while seeing its total profit stay the same or shrink because it is taking on less-profitable jobs while increasing general overhead costs.

Equipment as Profit Centers

Each piece of heavy equipment may be treated as a profit center. To do this management needs to know the revenues and the costs of each piece of equipment. These revenues and costs are tracked within the equipment ledger. There are a number of reasons for treating the equipment as profit centers.

First, management must decide if the company is using the equipment enough to justify owning the equipment or if the company would be better off renting the equipment on a monthly, weekly, or daily basis. It is important to note that if management is looking at hiring a subcontractor to provide the equipment, it is looking at replacing a crew because they would be replacing both equipment and labor. When making this decision, the cost of owning the equipment is compared to the fair market value of renting the equipment. The fair market value of the equipment is the cost to rent the equipment from the local equipment rental business. This decision is made for each piece of equipment and should be made periodically, for example, annually.

Second, management must decide if the company is spending so much on the repair of the old equipment that it would be better to replace the old equipment with new equipment. This decision is made by comparing the historical costs of the company's equipment to the projected costs of the new equipment. When comparing the different life expectancies of the new and old equipment, management must take into account the difference in their costs and the time value of money when making these decisions. Quantitative methods that may be used in making this decision are discussed in Chapters 17 and 18.

Third, management must decide if the equipment is seeing a lot of unnecessary repairs due to abuse or poor maintenance practices. To address this issue, costs for unexpected repairs must be tracked separately from the cost of routine maintenance and expected repairs—such as engine overhauls that occur every 200,000 miles. In Figure 2-8, the repairs and maintenance category is subdivided into repairs, maintenance, and tires subcategories. The repairs subcategory would be used to track unexpected repairs. Routine maintenance and expected repairs would be tracked in the maintenance category.

And, finally, management must decide if the company is spending enough on tire repairs to see if it would be more economical to foam-fill the tires or replace the equipment with a tracked vehicle. To address this issue the money spent on tires must be tracked. In Figure 2-8, the tire cost would be tracked in the tires subcategory under repairs and maintenance.

Conclusion

It is important for management to know where the company is making its profit. This allows management to focus on those areas that are most profitable, identify those areas that need improvement, identify unprofitable work that may

be eliminated or subcontracted out, and identify unprofitable customers. Profit may be increased above the company's minimum profit and overhead markup by skillful bidding and buying out of the project, good management of the crews, and by good project management. When analyzing the sources of profit, the company may be divided up in several ways. The profit may be divided among the minimum profit and overhead markup, the crews, the project teams, and the estimators, with the crews, project teams, and the estimators being the profit centers. Alternately, the profit may be divided among the different types of jobs, with each type of job being treated as a profit center. Finally, the profit may be divided up by customer, with each customer becoming a profit center. When analyzing profit, management often needs to allocate overhead. Overhead may be allocated based on the revenue generated, labor costs, material costs, usage of general office support, the incremental (change in overhead) associated with the profit center, or by some arbitrary assignment of the costs.

PROBLEMS

1. Your company completed the site work for the South Pointe office complex. The costs are shown in Figure 11-3. The site concrete labor and landscaping were done by subcontractors. The demolition and grubbing and the grading and excavation were done by the company's excavation crew. The company's minimum profit and overhead markup is 15%. Determine the profit generated by the estimator, project management, and the excavation crew on this project.
2. Your company completed the East Side subdivision. The costs are shown in Figure 11-4. The site concrete labor and outside lighting were done by subcontractors. The grading and excavation, sanitary sewer, water line, and storm drain were done by the company's excavation crew. The company's minimum profit and overhead markup is 15%. Determine the profit generated by the estimator, project management, and the excavation crew on this project.

Job: 411 South Pointe Site Work — May 15, 2004

Code	Description	Contract Amount	Billed to Date	Costs: Actual	Costs: Budget	Costs: Overrun
2050	Demolition & Grubbing			33,562	35,000	−1,438
2100	Grading & Excavation			20,500	19,500	1,000
2610	Site Conc.-Labor			19,200	19,200	0
2620	Site Conc.-Concrete			9,375	9,900	−525
2700	Landscaping			37,500	37,500	0
	Job Total	138,000	128,000	120,137	121,100	−963

FIGURE 11-3 Costs for South Pointe Site Work

Job: 424 East Side Subdivision — Sept. 1, 2004

Code	Description	Contract Amount	Billed to Date	Costs: Actual	Costs: Budget	Costs: Overrun
2100	Grading & Excavation			57,800	59,000	−1,200
2400	Sanitary Sewer			27,365	28,200	−835
2450	Water Line			31,750	31,000	750
2500	Storm Drain			16,850	17,000	−150
2610	Site Conc.-Labor			19,200	19,200	0
2620	Site Conc.-Concrete			21,265	20,900	365
2900	Outside Lighting			23,600	23,600	0
	Job Total	234,699	234,699	197,830	198,900	−1,070

FIGURE 11-4 Costs for East Side Subdivision Site Work

3. Your company worked on the projects shown as follows during the last year. Analyze the different profit centers based on their gross profit margins, their return on cash invested in the projects, and their use of management's time. One project manager can oversee three office remodel projects or one new construction project.

PROFIT CENTER	REVENUE ($)	GROSS PROFIT ($)	AVERAGE MONTHLY INVESTMENT ($)	DURATION MONTHS
Office Remodel	150,000	22,272	37,500	4
Office Remodel	75,000	13,854	25,000	3
Office Remodel	55,000	10,120	27,500	2
New Construction	375,000	41,659	23,000	8
New Construction	325,000	35,555	20,000	8
New Construction	270,000	32,338	24,000	6

4. Your company worked on the projects shown as follows during the last year. Analyze the different profit centers based on their gross profit margins, their return on cash invested in the projects, and their use of management's time. One project manager can oversee four subdivisions or one road construction project.

PROFIT CENTER	REVENUE ($)	GROSS PROFIT ($)	AVERAGE MONTHLY INVESTMENT ($)	DURATION MONTHS
Subdivision	500,000	73,334	83,333	6
Subdivision	375,000	46,954	75,000	5
Subdivision	177,000	17,079	44,250	4
Road	1,123,000	137,968	140,375	8
Road	1,564,800	112,660	156,480	10