

Expenses (Outflow)

6

Progress Notes

After completing this chapter, you should be able to

1. Understand the distinction between expense and cost.
2. Understand how disbursements for services represent an expense stream (an outflow).
3. Follow how expenses are grouped in different ways for planning and control.
4. Recognize why cost reports have influenced expense formats.

OVERVIEW

Expenses are the costs that relate to the earning of revenue. Another way to think of expenses is as the costs of doing business. Just as revenues represent the inflow into the organization, so do expenses represent the outflow—a stream of expenditures flowing out of the organization. Examples of expenses include salary expense for labor performed, payroll tax expense for taxes paid on the salary, utility expense for electricity, and interest expense for the use of money.

In fact, expenses are expired costs—costs that have been used up, or consumed, while carrying on business. Revenues and expenses affect the equity of the business. The inflow of revenues increases equity, whereas the outflow of expenses decreases equity. In nonprofit organizations, the term is fund balance rather than equity. This is because a nonprofit organization, by its nature, is not in business to make a profit. Thus, it should not have equity. However, the principle of inflow and outflow remains the same. In the case of nonprofits, the inflow of revenues increases fund balance, and the outflow of expenses decreases fund balance.

Many managers use the terms expense and cost interchangeably. Expense in its broadest sense includes every expired (used up) cost that is deductible from revenue. A narrower interpretation groups expenses into categories such as operating expenses, administrative expenses, and so on. Cost is the amount of cash expended (or property transferred, services performed, or liability incurred) in consideration of goods or services received or to be received. As we have already said, costs can be either expired or unexpired. Expired costs are used up in the current period and are thus matched against current revenues. Unexpired costs are not yet used up and will be matched against future revenues.¹

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For example, an electric bill for \$500 is recorded in the books of the clinic as an expense. The administrator sees the \$500 as the cost of electricity for that month in the clinic. The administrator is actually correct in seeing the \$500 as a cost because it has been paid by the administrator within the month. Confusion also exists in healthcare reporting over the term cost versus the term charge. Charges are revenue, or inflow. Costs are expenses, or outflow. Charges add costs when they are inherently different, they should never be intermingled. Because the two are inherently different, they should never be intermingled.

DISBURSEMENTS FOR SERVICES

There are two types of disbursements for services:

1. Payment when expense is incurred. If an expense is paid for at the point where the cost is incurred, it does not enter the accounts payable account. In large organizations, it is very rare to see payments when expenses are incurred. The only place where this may occur is the petty cash fund.
2. Payment after expense is incurred. In most healthcare organizations, expenses are not paid at a later time and not at the point when the expense is incurred. If this is the case, an expense is recorded in the accounts payable account. It is cleared from accounts payable when payment is made. One measurement of operations is "days in accounts payable" whereby the operating expenses for the organization are reduced to a rate per day compared with the amount in accounts payable.

GROUPING EXPENSES FOR PLANNING AND CONTROL

Cost Centers

A cost center is one form of a responsibility center. In a responsibility center, the manager is responsible, as the name implies, for a particular set of activities. In the case of a cost center, the particular unit of the organization is given responsibility for controlling costs of the operation over which it holds authority. The medical records division is an example of a cost center. The billing and collection office might be another example. A cost center might be a division, an office, or an entire department, depending on how the organization is structured.

In healthcare organizations, it is common to find departments as cost centers. This is the logical way to designate a cost center because the lines of authority are generally organized by department. Cost centers can then be grouped into larger groups that have something in common. Within this method of grouping, the manager of a cost center may receive his or her reports and figures, but not those of the entire group. The director or officer that is in charge of all of those particular departments receives the larger report that contains multiple cost centers. The chief executive officer receives a total report because he or she is ultimately responsible for overseeing the operations of all of the cost centers involved in that segment of the organization. **Exhibit 6-1** illustrates this concept. It contains 20 different cost centers, all of which are professional services. The 20 cost centers are divided into two groups: nursing services and other operating rooms to obstetrics-nursery. There are five cost centers in the nursing services and other operating rooms to obstetrics-nursery. There are 15 cost centers in the other professional services group. In the hospital that uses the grouping shown in **Exhibit 6-1**, however, not all

the 20 cost centers are departments. Some are divisions within departments. For example, EKG and EEG operate out of the same department but are two separate cost centers. **Exhibit 6-2** shows 11 different cost centers that are not directly revenue producing. (The dietary department yields some cafeteria revenue, but that revenue is not central to the major business of the organization, which is to provide healthcare services.) The 11 cost centers are divided into two groups: general services and support services. The 6 cost centers in the general services group happen to all be departments in this hospital. (Other hospitals might not have security as a separate department. The other cost centers—dietary, maintenance, laundry, housekeeping, and medical records—would be separate departments.) The 5 cost centers in the support services group include a "general" cost center that contains administrative costs; the remaining 4 are related to employee salaries and wages. These 4 are insurance, Social Security taxes, employee welfare, and pension cost centers, all of which will probably be in the same department. It is the prerogative of management to set up cost centers specific to the organization's own needs and preferences. It is the responsibility of management to make the cost centers match the proper lines of authority.

Exhibit 6-2 illustrates two categories of healthcare expense: general services and support. A third related category is operations expense. An operations expense provides service directly related to patient care. Examples are radiology expense and drug expense. A general services expense provides services necessary to maintain the patient, but the service is not directly related to patient care. Examples are laundry and dietary. Support services expenses, on the other hand, provide support to both general services expenses and operations expenses. A support service expense is necessary for support, but it is neither directly related to patient care nor is it a service necessary to maintain the patient. Examples of support services are insurance and payroll taxes.

Diagnoses and Procedures

It is common to group expenses by diagnoses and procedures for purposes of planning and control. This grouping is beneficial because it matches costs against common classifications

Exhibit 6-1 Nursing Services and Other Professional Services Cost Centers

Nursing Services Cost Center	
Routine Medical/Surgical	\$390,000
Operating Room	30,000
Intensive Care Units	40,000
OB-Nursery	15,000
Other	35,000
Total	\$510,000
Other Professional Services Cost Center	
Laboratory	\$220,000
Radiology	139,000
CT Scanner	18,000
Pharmacy	128,000
Emergency Service	89,000
Medical and Surgical Supply	168,000
Operating Rooms and Anesthesia	142,000
Respiratory Therapy	48,000
Physical Therapy	64,000
EKG	16,000
EEG	1,000
Ambulance Service	7,000
Substance Abuse	43,000
Home Health and Hospice	120,000
Other	12,000
Total	\$1,215,000

Exhibit 6-2 General Services and Support Services Cost Centers

General Services Cost Center	
Dietary	\$97,000
Maintenance	92,000
Laundry	27,000
Housekeeping	43,000
Security	5,000
Medical Records	30,000
Total	\$294,000

Support Services Cost Center	
General	\$455,000
Insurance	24,000
Social Security Taxes	112,000
Employee Welfare	188,000
Pension	43,000
Total	\$822,000

separately. Unassigned is a default category and should have little assigned to it. Outpatient's separate cost center at the preference of management.

Exhibit 6-5 illustrates the grouping of costs for MDC 18 (Infectious Diseases). The hospital's departmental code is 18, per Exhibit 6-4. The DRG classification, ranging from 415 to 423, appears in the next column. The description of the particular DRG appears in the third column, and the related cost appears in the fourth and final column. These costs can now be readily matched to equivalent revenues.

Outpatient services in particular are generally designated by procedure codes. Procedure codes, known as Current Procedural Terminology (CPT) codes, are commonly used to group cost centers for outpatient services. (CPT codes represent a listing of descriptive terms and identifying codes for identifying medical services and procedures performed.) However, procedures can be—and are—also used for purposes of grouping inpatient costs, generally within a certain cost center. A hospital example of reporting radiology department costs by procedure code appears in **Table 6-1**. In this example, the procedure code is in the left column, the description of the procedure is in the middle column, and the departmental cost for the particular procedure appears in the right column. These costs can now be readily matched to equivalent revenue.

Care Settings and Service Lines

Expenses can be grouped by care setting, which recognizes the different sites at which services are delivered. "Inpatient" versus "outpatient" is a basic type of care setting grouping. Other expenses can be classified by service lines, a method that groups similar services.³

Exhibit 6-3 Major Diagnostic Categories

MDC 1	Diseases and Disorders of the Nervous System
MDC 2	Eye
MDC 3	Ear, Nose, Mouth, and Throat
MDC 4	Respiratory System
MDC 5	Circulatory System
MDC 6	Digestive System
MDC 7	Hepatobiliary System and Pancreas
MDC 8	Musculoskeletal System and Connective Tissue
MDC 9	Skin, Subcutaneous Tissue, and Breast
MDC 10	Endocrine, Nutritional, and Metabolic
MDC 11	Kidney and Urinary Tract
MDC 12	Male Reproductive System
MDC 13	Female Reproductive System
MDC 14	Pregnancy, Childbirth, and the Puerperium
MDC 15	Newborns and Other Neonates with Conditions Originating in the Perinatal Period
MDC 16	Blood and Blood-Forming Organs and Immunological Disorders
MDC 17	Myceloproliferative and Poorly and Differentiated Neoplasms
MDC 18	Infections and Parasitic Diseases (Systemic or Unspecified Sites)
MDC 19	Mental Diseases and Disorders
MDC 20	Alcohol/Drug Use and Alcohol/Drug-Induced Organic Mental Disorders
MDC 21	Injuries, Poisoning, and Toxic Effect of Drugs
MDC 22	Burns
MDC 23	Factors Influencing Health Status and Other Contacts with Health Services

Exhibit 6-4 Hospital Departmental Code List Based on Major Diagnostic Categories

1	Nervous System
2	Eye
3	Ear, Nose, Mouth, and Throat
4	Respiratory System
5	Circulatory System
6	Digestive System
7	Hepatobiliary System
8	Musculoskeletal System and Connective Tissue
9	Skin, Subcutaneous Tissue, and Breast
10	Endocrine, Nutritional, and Metabolic
11	Kidney and Urinary Tract
12	Male Reproductive System
13	Female Reproductive System
14	Obstetrics
15	Newborns
16	Immunology
17	Oncology
18	Infectious Diseases
19	Mental Diseases
20	Substance Use
21	Injury, Poison, and Toxin
22	Burns
23	Other Health Services
24	Special Drugs
25	HIV
26	Unassigned
59	Outpatient

If revenues are grouped by care setting or by service line, as discussed in the previous chapter, then expenses should also be grouped by these categories. In that way, matching of revenues and expenses can readily occur. A more detailed discussion of care settings and service lines, with examples, was presented in the preceding chapter.

Programs

A program can be defined as a project that has its own objectives and its own program

Exhibit 6-5 Example of Hospital Departmental Costs Classified by Diagnoses, ICD, and DRG

Hospital Departmental Code	DRG	Description	Cost
18 INFECTIOUS DISEASES	415	O/R—INFECT/PARASITIC DIS	\$14,050
18 INFECTIOUS DISEASES	416	SEPTICEMIA 17	10,900
18 INFECTIOUS DISEASES	417	SEPTICEMIA 0-17	20,900
18 INFECTIOUS DISEASES	418	POSTOP/POSTTRAU/MA/INFECT	2,900
18 INFECTIOUS DISEASES	419	FEVER—UNK ORIG 17W/C	3,000
18 INFECTIOUS DISEASES	420	FEVER—UNK ORIG 17W/OC	6,000
18 INFECTIOUS DISEASES	421	VIRAL ILLNESS 17	1,400
18 INFECTIOUS DISEASES	422	VIR ILL/FEVER UNK 0-17	1,000
18 INFECTIOUS DISEASES	423	OT/INFECT/PARASITIC DX	3,000

Table 6-1 Example of Radiology Department Costs Classified by Procedure Code

Procedure Code	Procedure Description	Department Cost
557210	Ribs, Unilateral	\$ 60,000
557230	Spine Cervical Routine	125,000
557280	Pelvis	33,000
557320	Limb—Shoulder	55,000
557360	Limb—Wrist	69,000
557400	Limb—Hip, Unilateral	42,000
557410	Limb—Hip, Bilateral	14,000
557430	Limb—Knee Only	62,000
	Total	\$460,000

Exhibit 6-6 Program Cost Center: Southside Homeless Shelter Center

Program:	Southside Homeless Shelter Center
Department:	Feeding Ministry
For the Month of:	January 20XX
Raw Food	\$14,050
Dietary Supplies	200
Paper Supplies	300
Minor Equipment	50
Consultant Dietitian	50
Utilities	300
Telephone	50
Program Total	\$15,000

indicators. Within management's functioning planning, controlling, and decision making the program must stand on its own. A program is often funded separately and for finite periods of time. For example, funds from a grant may fund a specific project for—as an example—three years. Often programs—specialty line funded separately from the revenue stream—the main organization—have to arrange the expenses in a special format that is specific to the entity that provides the grant funds.

Program expenses should be grouped in such a way that they are distinguishable. If such programs have been specially funded the reporting of their expenses should not be commingled. An example of a program or center is given in Exhibit 6-6. This cost center example has received special funds and may be reported separately, as shown.

COST REPORTS AS INFLUENCERS OF EXPENSE FORMATS

Cost reports are required by both the Medicare program (Title XVIII) and the Medicaid program (Title XIX). Every provider participating in the program is required to file an annual cost report. A selection of providers who must file cost reports is illustrated in Table 6-2. The arrangement of expense line items on the cost reports has been primarily consistent since the advent of such reports

Table 6-2 Selected Cost Report Forms

Type	Form
Hospital and Hospital Healthcare Complex	CMS 2552-10
Skilled Nursing Facility and Skilled Nursing Facility Complex	CMS 2540-10
Home Health Agencies	CMS 1728-94

in 1966. Therefore, this standard and traditional arrangement has strongly influenced the arrangement of expenses in many healthcare information systems.

The cost report uses a method of cost finding. Its focus is what is called a cost center. The concept is not the same as the type of responsibility center "cost center" that has been discussed earlier in this chapter. Instead, the cost-finding "cost center" is, broadly speaking, a type of cost pool used in the cost-finding process. The primary purpose of the cost pool/cost center in cost finding is to assist in allocating overhead.

The central worksheets for cost finding are Worksheet A, Worksheet B, and Worksheet B-1. Worksheet A contains the basic trial balance of all expenses for the facility. (Trial balances are discussed in a preceding chapter.) The beginning trial balance is reflected in the first three columns:

$$[\text{Column 1}] \quad [\text{Column 2}] \quad [\text{Column 3}]$$

$$\text{"Salaries"} + \text{"Other"} = \text{"Total"}$$

(all other expenses)

The trial balance is grouped at the outset into cost center categories. The placement of these categories and their respective line items on the page stay constant throughout the flow of Worksheets A, B, and B-1. The cost centers are grouped into seven categories:

1. General service
2. Inpatient routine service
3. Ancillary service
4. Outpatient service
5. Other reimbursable
6. Special purpose
7. Nonreimbursable

The line items within these seven categories represent the long-lived traditional arrangement that has strongly influenced the arrangement of expenses in so many healthcare information systems.

1 INFORMATION CHECKPOINT

What is needed? A report that shows expense in your organization. Where is it found? With your supervisor. How is it used? Examine the report to find various types of expenses; look for how the expense flow is handled on the report.

Cost Classifications

7

DISTINCTION BETWEEN DIRECT AND INDIRECT COSTS

Direct costs can be specifically associated with a particular unit or department or patient. The critical distinction for the manager is that the cost is directly attributable. Whatever the manager is responsible for—that is, the unit, the department, or the patient—is known as a *cost object*.

The somewhat vague definition of a cost object is any unit for which a separate cost measurement is desired. It might help the manager to think of a *cost object* as a *cost objective* instead.¹ The important thing is that direct costs can be traced. Indirect costs, on the other hand, cannot be specifically associated with a particular cost object. The controller's office is an example of indirect cost. The controller's office is essential to the overall organization itself, but its cost is not specifically or directly associated with providing healthcare services. The critical distinction for the manager is that indirect costs usually cannot be traced, but instead must be allocated or apportioned in some manner.² **Figure 7-1** illustrates the direct-indirect cost distinction.

To summarize, it is helpful to recognize that direct costs are incurred for the sole benefit of a particular operating unit—a department, for example. As a rule of thumb, if the answer to the following question is “yes,” then the cost is a direct cost: “If the operating unit (such as a department) did not exist, would this cost not be in existence?”

Indirect costs, in contrast, are incurred for the overall operation and not for any one unit. Because they are shared, indirect costs are sometimes called joint costs or common costs. As a rule of thumb, if the answer to the following question is “yes,” then the cost is an indirect cost: “Must this cost be allocated in order to be assigned to the unit (such as a department)?”

Progress Notes

After completing this chapter, you should be able to

1. Distinguish between direct and indirect costs.
2. Understand why the difference is important to management.
3. Understand the composition and purpose of responsibility centers.
4. Distinguish between product and period costs.

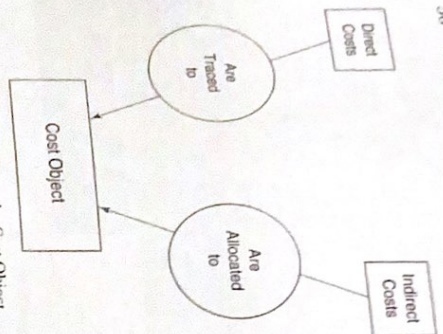


Figure 7-1 Assigning Costs to the Cost Object.

Greater detail is provided to the manager in **Table 7-2**, which presents the method of allocating indirect costs and the result of such allocation. Managers should notice that the "Indirect Costs" in **Table 7-2** carry forward and become the "Indirect Costs" in **Table 7-1**. In this report showing allocation of indirect costs is considered a subsidiary report because supporting, or subsidiary to, the preceding main report. This use of one or more supporting reports to reveal details behind the main report is quite common in managerial reporting. The allocation of indirect costs subsidiary report contains quite a lot of information, but what particular expenses (clerical salaries, administrative salaries, computer services) are included in the \$185,000 total. It also shows how each of these expenses are allocated across three separate types of therapy. And the report also shows how each item was allocated set Allocation Key containing codes A, B, and C. The basis for allocation is presented in the (A = number of visits, B = proportion of direct costs, by percentage; C = number of computers in service) and the computation detail by therapy type is also noted. This set of tables is part of further study by the manager.

Table 7-1 Examples of Rehab Cost Center Direct and Indirect Cost Totals

Rehab Cost Centers	Direct Cost	Indirect Cost	Total
Physical Therapy (PT)	\$410,000	\$107,500	\$517,500
Occupational Therapy (OT)	190,000	44,000	234,000
Speech Therapy (ST)	120,000	33,500	153,500
Total	\$720,000	\$185,000	\$905,000

Note: Direct Cost percentages, rounded, are as follows:
 PT = 67%/OT = 26%/ST = 17%/Total = 100%
 Courtesy of J. J. Baker and R. W. Baker, Dallas, Texas

EXAMPLES OF DIRECT COST AND INDIRECT COST

It is important for managers to trace direct and indirect costs and how they are reported on reports. Two sets of reports illustrate the reporting of direct and indirect costs. The first example concerns a rehab center; the second concerns an ambulance service center.

Table 7-1 represents a report of both direct and indirect cost for a rehab cost center. The report concerns three types of therapy: physical, occupational, and speech therapy and a total. In this report, the manager can observe the proportionate difference between direct and indirect costs and can see the differences among the three types of therapies.

Table 7-2 Example of Indirect Costs Allocated to Rehab Cost Center

Allocation Basis:	Clerical Salaries	Administrative Salaries	Computer Services	Total Indirect Cost
	A	B	C	
Indirect Cost to Be Allocated	\$60,000	\$50,000	\$75,000	\$185,000
Allocated to:				
Physical Therapy (PT)	34,000	28,500	45,000	107,500
Occupational Therapy (OT)	16,000	13,000	15,000	44,000
Speech Therapy (ST)	10,000	8,500	15,000	33,500
Proof Total	\$60,000	\$50,000	\$75,000	\$185,000

Allocation Key:
 A = # Visits (Volume): PT = 8500/OT = 4000/ST = 2500/Total = 15,000 (15,000 x \$4.00 = \$60,000)
 B = Proportion of Direct Costs: PT = 57%/OT = 26%/ST = 17%/Total = 100% (% x \$50,000)
 C = # Computers in Service: PT = 9/OT = 3/ST = 3/Total = 15 (15 x \$5,000 each = \$75,000)

Courtesy of J. J. Baker and R. W. Baker, Dallas, Texas.

Exhibit 7-1 sets out the direct costs for an ambulance service center. These costs, as direct costs, are what the organization's managers believe can be traced to the specific operation of the freestanding center. **Exhibit 7-2** sets out the indirect costs for a freestanding ambulance service center. These costs are what the organization's managers believe are not directly attributable to the specific operation of the freestanding center. The decisions about what will and what will not be considered direct or indirect costs will almost always have been made for the manager.³ What is important is that the manager understand two things: first, why this is so, and second, how the relationship between the two works. Remember the rule of thumb discussed earlier in this chapter: If the answer to the following question is "yes," then the cost is a direct cost: "If the operating unit (such as a department) did not exist, would this cost not be in existence?"

Exhibit 7-1 Example of Ambulance Direct Costs

Ambulance salaries & benefits	\$92,500
RN salaries & benefits	9,600
Vehicle expense	21,300
Supplies	5,000
Uniforms	1,200
Employee education	3,900
Purchased services	1,900
Purchased maintenance	2,600
Utilities & telephone	5,000
Vehicle depreciation	15,000
Miscellaneous expense	2,000
Total direct costs	\$100,000

Exhibit 7-2 Example of Ambulance Indirect Costs

Administrative costs	\$12,000
Facility costs	8,000
Total indirect costs	\$20,000

RESPONSIBILITY CENTERS

We previously discussed revenue centers, whereby managers are responsible for generating revenue (or volume). We also previously discussed cost centers, whereby managers are

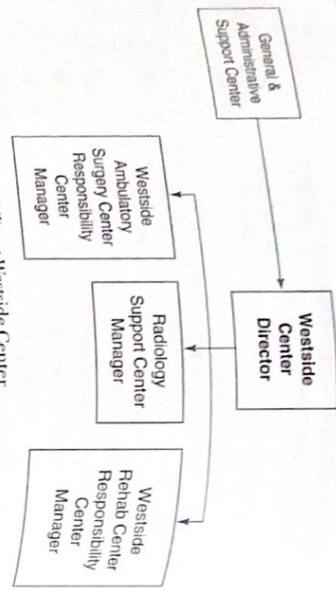


Figure 7-2 Lines of Managerial Responsibility at Westside Center
 Courtesy of Resource Group, Ltd., Dallas, Texas

responsible for managing and controlling cost. The responsibility center (R/C) makes a manager responsible for both the revenue/volume (inflow) side and the expense (outflow) side of department, division, unit, or program. In other words, the manager is responsible for generating revenue/volume and for controlling costs. Another term for responsibility center is *profit center*. We will examine the type of information a manager receives about his or her responsibility center by reviewing the Westside Center operations. Westside Center offers three basic types of services: an ambulatory surgery center (ASC) and a rehabilitation center. Management of Westside is overseen by Bill, the director. Joe manages the ambulatory surgery center, Bonnie manages the rehabilitation center, Denise, a part-time radiologist, provides radiology services on an as-needed basis, Joe, Bonnie, and Denise, the managers, all report to the director. Figure 7-2 illustrates the managerial relationships.

To restate the relationships shown in Figure 7-2, Joe manages a responsibility center's ambulatory surgery services, Bonnie manages a responsibility center for rehabilitation services, but this is not a responsibility center in the Westside organization. Instead, it is a support center. Bill, the director, manages a bigger responsibility center that includes all of the functions just described, plus the general and administrative support center.

Bill, the director, receives a manager report, shown in Exhibit 7-3. Bill's Director Summary¹ contains the data for the Westside operation.

Exhibit 7-3 Director's Summary of Westside ASC and Rehab Responsibility Center

ASC R/C Surplus	\$70,000.00
Rehab R/C Surplus	85,000.00
Less G&A Support Ctr	(80,000.00)
Less Radiology Support Ctr	(20,000.00)
Net Surplus	\$55,000.00

Courtesy of Resource Group, Ltd., Dallas, Texas.

Figure 7-3 illustrates the reports received by each manager at Westside. Joe's report for the ambulatory surgery center is at the top right of Figure 7-3. His report shows controllable revenues he is responsible for (\$225,000), less the controllable expense is responsible for (\$155,000). The difference is labeled "ASC Responsibility Center Surplus" on his report. The surplus amounts to \$70,000 (\$225,000 minus \$155,000).

Director's Summary of Westside ASC & Rehab Center

ASC R/C Surplus	\$70,000.00
Rehab R/C Surplus	85,000.00
Less G&A Support Ctr	(80,000.00)
Less Radiology Support Ctr	(20,000.00)
Net Surplus	\$55,000.00

Westside ASC Responsibility Center	
Controllable revenues:	
Patient fees	120,000.00
Wages	30,000.00
Payroll taxes, other fringes	50,000.00
Billable supplies	10,000.00
Medical supplies	3,000.00
Continuing education	2,000.00
Licenses and permits	
Total expenses	215,000.00
Rehab R/C surplus	\$85,000.00

Westside ASC Responsibility Center	
Controllable revenues:	
Patient fees	120,000.00
Wages	30,000.00
Payroll taxes, other fringes	50,000.00
Billable supplies	10,000.00
Medical supplies	3,000.00
Continuing education	2,000.00
Licenses and permits	
Total expenses	215,000.00
Rehab R/C surplus	\$85,000.00

Westside ASC Responsibility Center	
Controllable revenues:	
Patient fees	120,000.00
Wages	30,000.00
Payroll taxes, other fringes	50,000.00
Billable supplies	10,000.00
Medical supplies	3,000.00
Continuing education	2,000.00
Licenses and permits	
Total expenses	215,000.00
Rehab R/C surplus	\$85,000.00

General & Administrative Support Center	
Salaries	\$40,000.00
Payroll taxes, other fringes	10,000.00
Office supplies	1,200.00
Telephone	2,400.00
Rent	10,800.00
Utilities	4,800.00
Insurance	1,200.00
Depreciation	9,600.00
Total expenses	\$80,000.00

Radiology Support Center	
Salaries	\$12,000.00
Payroll taxes, other fringes	3,000.00
Radiology supplies	5,000.00
Total expenses	\$20,000.00

Figure 7-3 Westside Costs by Responsibility Center
 Courtesy of Resource Group, Ltd., Dallas, Texas

Bonnie's report for the rehabilitation center is the second report on the right of Figure 7-3. Her report shows the controllable revenues she is responsible for (\$300,000), less the controllable expenses she is responsible for (\$215,000). The difference is labeled "Rehab Responsibility Center Surplus" on her report. The surplus amounts to \$85,000 (\$300,000 minus \$215,000).

Denise's report for radiology services is at the bottom right of Figure 7-3. Her report shows the controllable expenses she is responsible for, which amount to \$20,000. Her report shows only expenses because it is a support center, not a responsibility center. Therefore, Denise is responsible for expenses but not for revenue/volume.

Bill, the director, receives a report for the general and administrative (G&A) expenses, as shown second from the bottom on the right of Figure 7-3. This report shows the G&A controllable expenses that Bill himself is responsible for at Westside, which amount to \$80,000. The G&A report shows only expenses because it also is a support center, not a responsibility center. Therefore, Bill is responsible for expenses but not for revenue/volume in the case of G&A.

However, Bill is also responsible for the entire Westside operation. That is, the overall Westside operation is his responsibility center. Therefore, Bill's director's summary, reproduced on the left side of Figure 7-3, contains the results of both responsibility centers and both support centers. The surplus figures from Joe and Bonnie's reports are positive figures of \$70,000 and \$85,000, respectively. The expense-only figures from Bill's G&A support center report and from Denise's radiology support center report are negative figures of \$80,000 and \$20,000, respectively. Therefore, to find the result of operations for Bill's entire Westside operation, the \$80,000 and the \$20,000 expense figures are subtracted from the surplus figures to arrive at a net surplus for Westside of \$55,000.

Although the lines of managerial responsibility will vary in other organizations, the relationships between and among responsibility centers, support centers, and overall supervision will remain as shown in this example.

DISTINCTION BETWEEN PRODUCT AND PERIOD COSTS

Product costs is a term that was originally associated with manufacturing rather than with services. The concept of product costs assumes that a product has been manufactured and placed into inventory while waiting to be sold. Then, whenever that product is sold, the product is matched with revenue and recognized as a cost. Thus, *cost of sales* is the common usage for manufacturing firms. (The concept of matching revenues and expenses has been discussed in a preceding chapter.)

Period costs, in the original manufacturing interpretation, are not connected with the manufacturing process. They are matched with revenue on the basis of the period during which the cost is incurred (thus *period costs*). The term comes from the span of time in which matching occurs, known as *time period*.

Service organizations have no manufacturing process as such. The business of healthcare service organizations is service delivery, not the manufacturing of products. Although the overall concept of product versus period cost is not as vital to service delivery, the distinction remains important for managers in health care to know.

In healthcare organizations, product cost can be viewed as traceable to the cost object of the department, division, or unit. A period cost is not traceable in this manner. Another way to view this distinction is to think of product costs as those costs necessary to actually deliver the service, whereas period costs are costs necessary to support the existence of the organization itself.

Finally, medical supply and pharmacy departments do have inventories on hand. In their case, a product is purchased (rather than manufactured) and placed into inventory while waiting to be dispensed. Then, whenever that product is dispensed, the product is matched with revenue and recognized as a cost of providing the service to the patient. Therefore, the product cost concept is important to managers of departments that hold a significant amount of inventory.



Costs of
Direct Costs
Indirect Costs
Joint Costs
Responsibility



DISCUSS

1. In your own words, what is a product cost?
2. What is the difference between a product cost and a period cost?
3. Does your organization have product costs? If so, what are they?
4. If not, do you have period costs? If so, what are they?
5. If so, do you have joint costs? Why or why not?

NOTES

1. C. Horngren et al., *Cost Accounting: A Managerial Emphasis*, 10th ed. (Upper Saddle River, NJ: Prentice Hall, 1998).
2. J. J. Baker, *Activity-Based Costing*, 2nd ed. (New York, NY: Aspen Publishers, 1998).
3. D. A. West, T. D. West, and J. R. West, *Activity-Based Costing: A Practical Approach to Achieving Strategic Objectives* (New York, NY: Aspen Publishers, 1998).

Cost Behavior and Break-Even Analysis

8

DISTINCTIONS AMONG FIXED, VARIABLE, AND SEMIVARIABLE COSTS

This chapter emphasizes the distinctions among fixed, variable, and semivariable costs because this knowledge is a basic working tool in financial management. The manager needs to know the difference between fixed and variable costs to compute contribution margins and break-even points. The manager also needs to know about semivariable costs to make good decisions about how to treat these costs.

Fixed costs are costs that do not vary in total when activity levels (or volume) of operations change. This concept is illustrated in **Figure 8-1**. The horizontal axis of the graph shows number of residents in the Jones Group Home, and the vertical axis shows total monthly fixed cost in dollars. In this graph, the total monthly fixed cost for the group home is \$3,000, and that amount does not change, whether the number of residents (the activity level or volume) is low or high. A good example of a fixed cost is rent expense. Rent would not vary whether the home was almost full or almost empty; thus, rent is a fixed cost.

Variable costs, on the other hand, are costs that vary in direct proportion to changes in activity levels (or volume) of operations. This concept is illustrated in **Figure 8-2**. The horizontal axis of the graph shows number of residents in the Jones Group Home, and the vertical axis shows total monthly variable cost in dollars. In this graph, the monthly variable cost for the group home changes proportionately with the number of residents (the activity level or volume) in the home. A good example of a variable cost is food for the group home residents. Food would vary directly, depending on the number of individuals in residence; thus, food is a variable cost.

Progress Notes

After completing this chapter, you should be able to

1. Understand the distinctions among fixed, variable, and semivariable costs.
2. Be able to analyze mixed costs by two methods.
3. Understand the computation of a contribution margin.
4. Be able to compute the cost-volume-profit (CVP) ratio.
5. Be able to compute the profit-volume (PV) ratio.

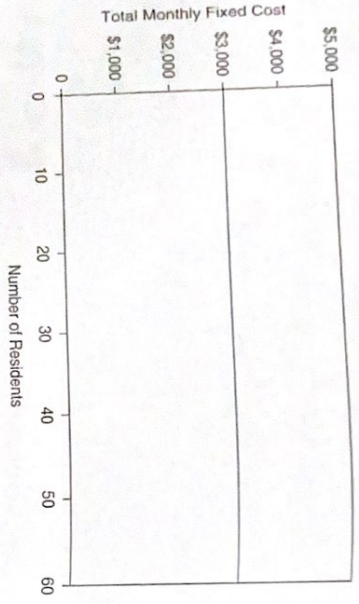


Figure 8-1 Fixed Costs—Jones Group Home.

Semivariable costs vary when the activity levels (or volume) of operations change, but not in direct proportion. The most frequent pattern of semivariable costs is the step pattern, where the semivariable cost rises, flattens out for a bit, and then rises again. The step pattern of semivariable costs is illustrated in Figure 8-3. The horizontal axis of the graph shows number of residents in the Jones Group Home, and the vertical axis shows total monthly semivariable cost. In this graph, the behavior of the cost line resembles stair steps; thus, the "step pattern" name for this configuration. The most common example of a semivariable expense in health care is supervisors' salaries. A single supervisor, for example, can perform adequately over a range of rises in activity levels (or volume). When another supervisor has to be added, the rise in the step pattern occurs.

It is important to know, however, that there are two ways to think about fixed cost. The usual view is the flat line illustrated on the graph in Figure 8-1. That flat line represents total monthly cost for the group home. However, another perception is presented in Figure 8-4. The top view of fixed cost in Figure 8-4 is the usual flat line just discussed. The bottom view is fixed cost per resident. Think about the figure for a moment: the top view is dollars in total for the home for

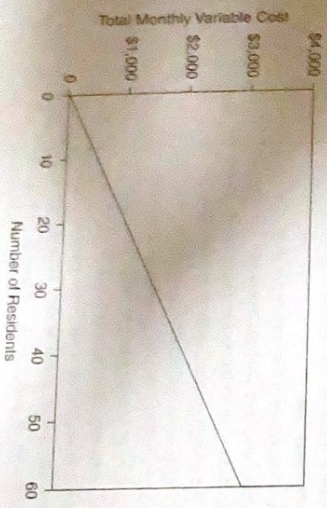


Figure 8-2 Variable Cost—Jones Group Home.

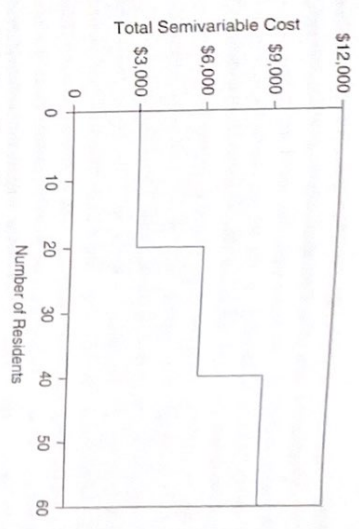


Figure 8-3 Semivariable Cost—Jones Group Home.

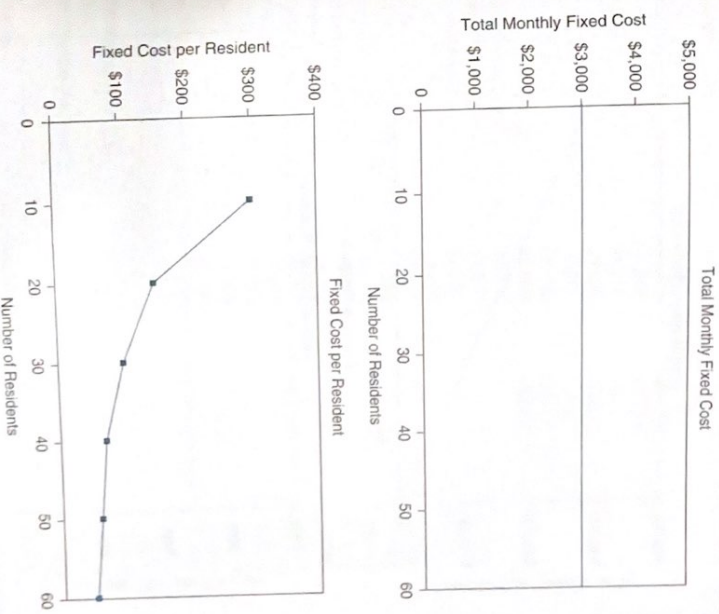


Figure 8-4 Two Views of Fixed Costs.

the month, and the bottom view is fixed-cost dollars by number of residents. The line is not flat but declines because this view of cost declines with each additional resident.

We can also think about variable cost in two ways. The usual view of variable cost is the diagonal line rising from the bottom of the graph to the top, as illustrated in Figure 8-2. That diagonal line represents monthly cost varying in direct proportion with number of residents in the home. However, another perception is presented in Figure 8-5. The top view of variable costs in Figure 8-5 represents total monthly variable cost and is the usual diagonal line we discussed. The bottom view is variable cost per resident. Think about this figure for a moment: the top view is dollars in total for the home for the month, and the bottom view is variable cost dollars by number of residents. The line is no longer diagonal but is now flat because this view of variable cost stays the same proportionately for each resident. A good way to think about

Figures 8-4 and 8-5 is to realize that they are close to being mirror images of each other. Semifixed costs are sometimes used in healthcare organizations, especially in regard to staffing. Semifixed costs are the reverse of semivariable costs: that is, they stay fixed for a time as activity levels (or volume) of operations change, but then they will rise; then they will plateau; then they will rise. Thus, semifixed costs can exhibit a step pattern similar to that of variable costs.¹ However, the semifixed cost "steps" tend to be longer between rises in cost.

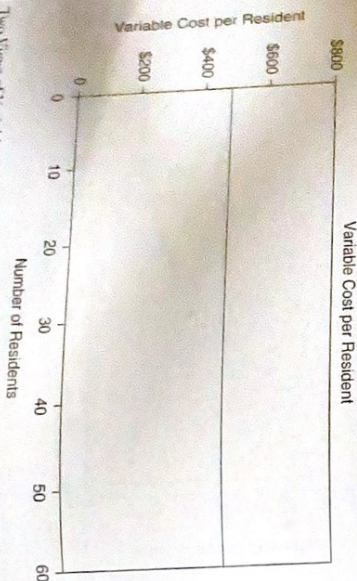
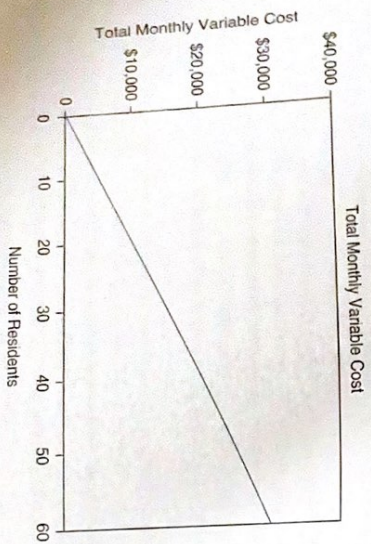


Figure 8-5 Two Views of Variable Costs.

summary, both semifixed and semivariable costs have mixed elements of fixed and variable costs. Thus, both semivariable and semifixed costs are called mixed costs.

EXAMPLES OF VARIABLE AND FIXED COSTS

Studying examples of expenses that are designated as variable and fixed helps to understand the differences between them. It should also be mentioned that some expenses can be variable to one organization and fixed to another because they are handled differently by the two organizations. Operating room fixed and variable costs are illustrated in Table 8-1.

Table 8-1 Operating Room Fixed and Variable Costs

Account	Total	Variable	Fixed	Equipment
Social Security	\$ 60,517	\$ 60,517	\$	\$
Pension	20,675	20,675		
Health Insurance	8,422	8,422		
Child Care	4,564	4,564		
Patient Accounting	155,356	155,356		
Admitting	110,254	110,254		
Medical Records	91,718	91,718		
Dietary	27,526	27,526		
Medical Waste	2,377	2,377		
Sterile Procedures	78,720	78,720		
Laundry	40,693	40,693		
Depreciation—Equipment	87,378			87,378
Depreciation—Building	41,377		41,377	
Amortization—Interest	(5,819)		(5,819)	
Insurance	4,216		4,216	
Administration	57,966		57,966	
Medical Staff	1,722		1,722	
Community Relations	49,813		49,813	
Materials Management	64,573		64,573	
Human Resources	31,066		31,066	
Nursing Administration	82,471		82,471	
Data Processing	17,815		17,815	
Fiscal	17,700		17,700	
Telephone	2,839		2,839	
Utilities	26,406		26,406	
Plant	77,597		77,597	
Environmental Services	32,874		32,874	
Safety	2,016		2,016	
Quality Management	10,016		10,016	
Medical Staff	9,444		9,444	
Continuous Quality Improvement	4,895		4,895	
EE Health	569		569	
Total Allocated	\$1,217,756	\$600,822	\$529,556	\$87,378

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Table 8-2 Operating Room Semivariable and Fixed Staffing

Job Positions	Total No. of FTEs	Semivariable	Fixed
Supervisor	22	30	22
Techs	30	77	
RNs	77	12	
LPNs	12	10	
Aides, orderlies	10	12	
Clerical	12		44
Totals	163	119	

for the operating room. (The further use of FTEs for staffing purposes is fully discussed in the chapter on staffing.) The supervisor position is fixed, which indicates that this is the minimum staffing that can be allowed. The single aide/orderly and the clerical position are also indicated as fixed. All the other positions—technicians, RNs, and LPNs—are listed as semivariable, which indicates that they are probably used in the semivariable-step pattern that has been previously discussed in this chapter. This table is a good example of how to show clearly which costs will be designated as semivariable and which costs will be designated as fixed.

Another example illustrates the behavior of a single variable cost in a doctor's office. In Table 8-3 we see an array of costs for the procedure code 99214 office visit type. Nine costs are listed. The first cost is variable and is discussed momentarily. The other eight costs are all shown at the same level for a 99214 office visit; supplies, for example, is the same amount in all four columns. The single figure that varies is the top line, which is "report of lab tests," meaning laboration reports. This cost directly varies with the proportion of activity or volume, as variable cost has been defined. Here we see a variable cost at work: the first column on the left has no lab report and the cost is zero; the second column has one lab report, and the cost is \$3.82; the third column has two lab reports, and the cost is \$7.64; and the fourth column has three lab reports, and

Table 8-3 Office Visit with Variable Cost of Tests

Service Code	99214 No Test	99214 1 Test	99214 2 Tests	99214 3 Tests
Report of lab tests	\$0.00	\$3.82	\$7.64	\$11.46
Fixed overhead	\$31.00	\$31.00	\$31.00	\$31.00
Physician	11.36	11.36	11.36	11.36
Medical assistant	1.43	1.43	1.43	1.43
Bill	0.45	0.45	0.45	0.45
Checkout	1.00	1.00	1.00	1.00
Receptionist	1.28	1.28	1.28	1.28
Collection	0.91	0.91	0.91	0.91
Supplies	0.31	0.31	0.31	0.31
Total visit cost	\$47.74	\$51.56	\$55.38	\$59.20

Thirty-two expense accounts are listed in Table 8-1; 11 are variable, 20 are designated as fixed by this hospital, and 1, equipment depreciation, is listed separately.² (The separate listing is because of the way this hospital's accounting system handles equipment depreciation.)

Another example of semivariable and fixed staffing is presented in Table 8-2. The costs are expressed as full-time equivalent staff (FTEs). Each line-item FTE will be multiplied times the appropriate wage or salary to obtain the semivariable and fixed costs

the cost is \$11.46. The total cost rises by the same proportionate increase as the increase in the first line.

ANALYZING MIXED COSTS

It is important for planning purposes for the manager to know how to deal with mixed costs because they occur so often. For example, telephone, maintenance, repairs, and utilities are all actually mixed costs. The fixed portion of the cost is that portion representing having the service (such as telephone) ready to use, and the variable portion of the cost represents a portion of the charge for actual consumption of the service. We briefly discuss two very simple methods of analyzing mixed costs, then we examine the high-low method and the scatter graph method.

Predominant Characteristics and Step Methods

Both the predominant characteristics and the step method of analyzing mixed costs are quite simple. In the predominant characteristic method, the manager judges whether the cost is more fixed or more variable and acts on that judgment. In the step method, the manager examines the "steps" in the step pattern of mixed cost and decides whether the cost appears to be more fixed or more variable. Both methods are subjective.

High-Low Method

As the name implies, the high-low method of analyzing mixed costs requires that the cost be examined at its high level and at its low level. To compute the amount of variable cost involved, the difference in cost between high and low levels is obtained and is divided by the amount of change in the activity (or volume). Two examples are examined.

The first example is for an employee cafeteria. Table 8-4 contains the basic data required for the high-low computation. With the formula described in the preceding paragraph, the following steps are performed:

1. Find the highest volume of 45,000 meals at a cost of \$165,000 in September (see Table 8-4) and the lowest volume of 20,000 meals at a cost of \$95,000 in March.
2. Compute the variable rate per meal:

	No. of Meals	Cafeteria Cost
Highest volume	45,000	\$165,000
Lowest volume	20,000	95,000
Difference	25,000	70,000

3. Divide the difference in cost (\$70,000) by the difference in number of meals (25,000) to arrive at the variable cost rate:
 $\$70,000 \text{ divided by } 25,000 \text{ meals} = \2.80 per meal

Table 8-2 Operating Room Semivariable and Fixed Staffing

Job Positions	Total No. of FTEs	Semivariable	Fixed
Supervisor	22	3.0	2.2
Techs	30	7.7	
RNs	77	12	
LPNs	12		1.0
Aides, orderlies	10		1.2
Clerical	12		1.2
Totals	163	11.9	4.4

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Physician	11.36	11.36	11.36	11.36
Medical assistant	1.43	1.43	1.43	1.43
Bill	0.45	0.45	0.45	0.45
Checkout	1.00	1.00	1.00	1.00
Recollection	1.28	1.28	1.28	1.28
Collection	0.91	0.91	0.91	0.91
Supplies	0.31	0.31	0.31	0.31
Total visit cost	\$47.74	\$51.56	\$55.38	\$59.20

the cost is \$11.46. The total cost rises by the same proportionate increase as the increase in the first line.

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As the name implies, the high-low method of analyzing mixed costs requires that the cost be examined at its high level and at its low level. To compute the amount of variable cost involved, the difference in cost between high and low levels is obtained and is divided by the amount of change in the activity (or volume). Two examples are examined. The first example is for an employee cafeteria. Table 8-4 contains the basic data required for the high-low computation. With the formula described in the preceding paragraph, the following steps are performed:

1. Find the highest volume of 45,000 meals at a cost of \$165,000 in September (see Table 8-4) and the lowest volume of 20,000 meals at a cost of \$95,000 in March.
2. Compute the variable rate per meal:

Highest volume	45,000	\$165,000
Lowest volume	20,000	95,000
Difference	25,000	70,000

3. Divide the difference in cost (\$70,000) by the difference in number of meals (25,000) to arrive at the variable cost rate:

$$\$70,000 \text{ divided by } 25,000 \text{ meals} = \$2.80 \text{ per meal}$$

Table 8-4 Employee Caterina Number of Meals and Cost by Month

Month	No. of Meals	Employee Caterina Cost (\$)
July	40,000	164,000
August	43,000	167,000
September	45,000	165,000
October	41,000	162,000
November	37,000	164,000
December	33,000	146,000
January	28,000	123,000
February	22,000	91,800
March	20,000	85,000
April	25,000	106,800
May	30,000	130,200
June	35,000	153,000

The number of drug samples used by the various members of the marketing staff. She uses the high-low method to determine the portion of fixed cost. Table 8-5 contains the basic data required for the high-low computation. Using the formula previously described, the following steps are performed:

1. Find the highest volume of 1,000 samples at a cost of \$5,000 (see Table 8-5) and the lowest volume of 750 samples at a cost of \$4,200.
2. Compute the variable rate per sample:

	No. of Samples	Cost
Highest volume	1,000	\$5,000
Lowest volume	750	4,200
Difference	250	\$ 800

3. Divide the difference in cost (\$800) by the difference in number of samples (250) to arrive at the variable cost rate:

$$\text{\$800 divided by 250 samples} = \text{\$3.20 per sample}$$

4. Compute the fixed overhead rate as follows:
 - a. At the highest level:

Total cost	\$5,000
Less: variable portion	(3,200)
Fixed portion of cost	\$1,800
 - b. At the lowest level:

Total cost	\$4,200
Less: variable portion	(2,400)
Fixed portion of cost	\$1,800

4. Compute the fixed overhead rate as follows:
 - a. At the highest level:

Total cost	\$165,000
Less: variable portion	(45,000 meals \times \$2.80 @)
Fixed portion of cost	(120,000)
At the lowest level	\$ 39,000
 - b. At the lowest level:

Total cost	\$ 95,000
Less: variable portion	[20,000 meals \times \$2.80 @]
Fixed portion of cost	(56,000)
Proof totals: \$39,000 fixed portion at both levels	\$ 39,000
 - c. Proof totals: \$39,000 fixed portion at both levels

The manager should recognize that big or small dollar amounts can be adapted to this method. A second example concerns drug samples and their cost. In this example a supervisor of marketing is concerned about

- b. At the lowest level

Total cost	\$4,200
Less: variable portion	[750 samples \times \$3.20 @]
Fixed portion of cost	(2,400)
Proof totals: \$1,800 fixed portion at both levels	\$1,800
- c. Proof totals: \$1,800 fixed portion at both levels

The high-low method is an approximation that is based on the relationship between the highest and the lowest levels, and the computation assumes a straight-line relationship. The advantage of this method is its convenience in the computation method.

CONTRIBUTION MARGIN, COST-VOLUME-PROFIT, AND PROFIT-VOLUME RATIOS

The manager should know how to analyze the relationship of cost, volume, and profit. This important information assists the manager in properly understanding and controlling operations. The first step in such analysis is the computation of the contribution margin.

Contribution Margin

The contribution margin is calculated in this way:

Revenues (net)	\$500,000	100%
Less: variable cost	(350,000)	70%
Contribution margin	\$150,000	30%
Less: fixed cost	(120,000)	
Operating income	\$30,000	

The contribution margin of \$150,000 or 30%, in this example, represents variable cost deducted from net revenues. The answer represents the contribution margin, so called because it contributes to fixed costs and to profits.

The importance of dividing costs into fixed and variable becomes apparent now, for a contribution margin computation demands either fixed or variable cost classifications; no mixed costs are recognized in this calculation.

Cost-Volume-Profit (CVP) Ratio or Break Even

The break-even point is the point when the contribution margin (i.e., net revenues less variable costs) equals the fixed costs. When operations exceed this break-even point, an excess of revenues over expenses (income) is realized. But if operations does not reach the break-even point, there will be an excess of expenses over revenues, and a loss will be realized.

The manager must recognize there are two ways of expressing the break-even point: either by an amount per unit or as a percentage of net revenues. If the contribution margin is expressed as a percentage of net revenues, it is often called the profit-volume (PV) ratio. A PV ratio example follows this cost-volume-profit (CVP) computation.

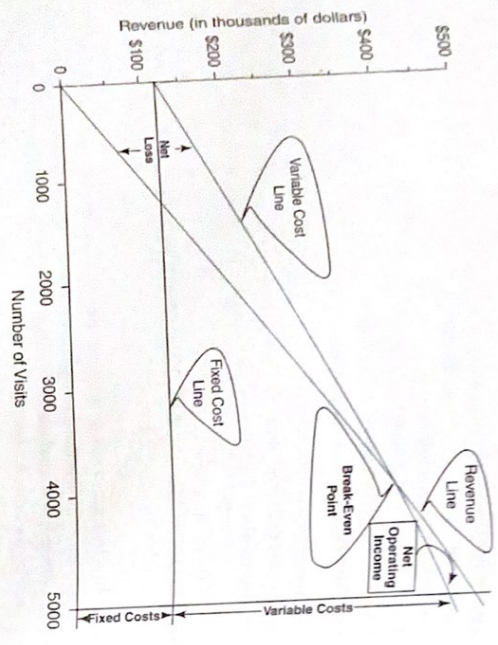


Figure 8-6 Cost-Volume-Profit (CVP) Chart for a Wellness Clinic. (Courtesy of Resource Group, Ltd., Dallas, Texas.)

The CVP example is given in Figure 8-6. The data points for the chart come from the contribution margin as already computed:

		% of Revenue
Revenues (net)	\$500,000	100%
Less: variable cost	(350,000)	70%
Contribution margin	\$150,000	30%
Less: fixed cost	(120,000)	
Operating income	\$30,000	

Three lines were first drawn to create the chart. They were total fixed costs of \$120,000, total revenue of \$500,000, and variable costs of \$350,000. (All three are labeled on the chart.) The break-even point appears at the point where the total cost line intersects the revenue line. Because this point is indeed the break-even point, the organization will have no profit and no loss but will break even. The wedge shape to the left of the break-even point is potential net loss, whereas the narrower wedge to the right is potential net income (both are labeled on the chart).

CVP charts allow a visual illustration of the relationships that is very effective for the manager.

Profit-Volume (PV) Ratio

Remember that the second method of expressing the break-even point is as a percentage of net revenues and that if the contribution margin is expressed as a percentage of net revenues, it

is called the profit-volume (PV) ratio. Figure 8-7 illustrates the method. The basic data points used for the chart were as follows:

Revenue per visit	\$100.00	100%
Less: variable cost per visit	(70.00)	70%
Contribution margin per visit	\$ 30.00	30%
Fixed costs per period	\$120,000	

\$30,000 contribution margin per visit divided by \$100 price per visit = 30% PV Ratio

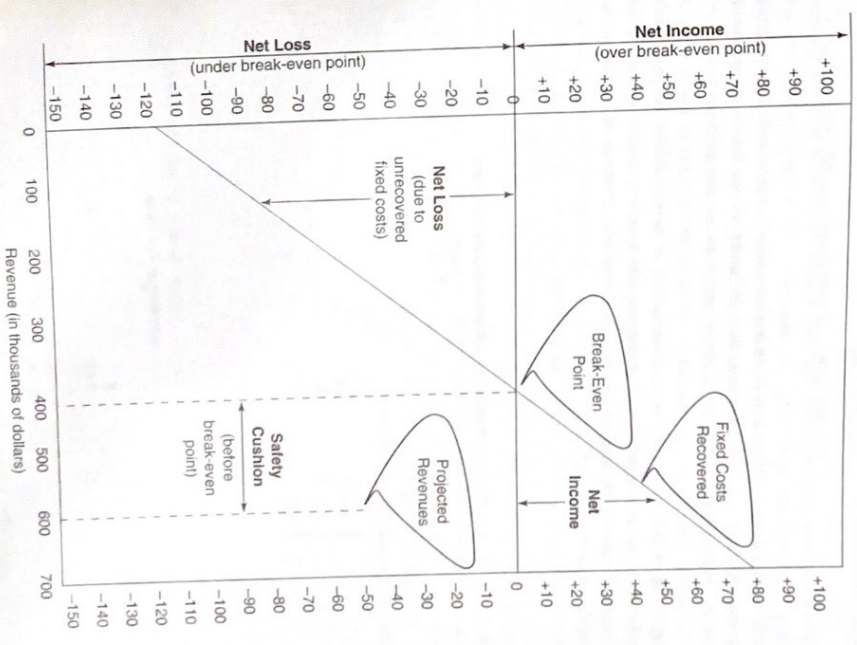


Figure 8-7 Profit-Volume (PV) Chart for a Wellness Clinic. (Courtesy of Resource Group, Ltd., Dallas, Texas.)

On our chart, the profit pattern is illustrated by a line drawn from the beginning level of fixed costs to be recovered (\$120,000 in our case). Another line has been drawn straight across the chart at the break-even point. When the diagonal line begins at \$120,000, its intersection with the break-even or zero line is at \$400,000 in revenue (see left-hand dotted line on chart). We can prove out the \$120,000 versus \$400,000 relationship as follows. Each dollar of revenue reduces the potential of loss by \$0.30 (or 30% × \$1.00). Fixed costs are fully recovered at a revenue level of \$400,000, proved out as \$120,000 divided by .30 = \$400,000. This can be written as follows:

$$.30R = \$120,000$$

$$R = \$400,000 \text{ [\$120,000 divided by .30 = 400,000]}$$

The PV chart is very effective in planning meetings because only two lines are necessary to show the effect of changes in volume. Both PV and CVP are useful when working with the effects of changes in break-even points and revenue volume assumptions.

Contribution margins are also useful for showing profitability in other ways. An example appears in Figure 8-8, which shows the profitability of various DRGs, using contribution margins as the measure of profitability. Case volume (the number of cases of each DRG) is on the vertical axis of the matrix, and the dollar amount of contribution margin per case is on the horizontal axis of the matrix.³

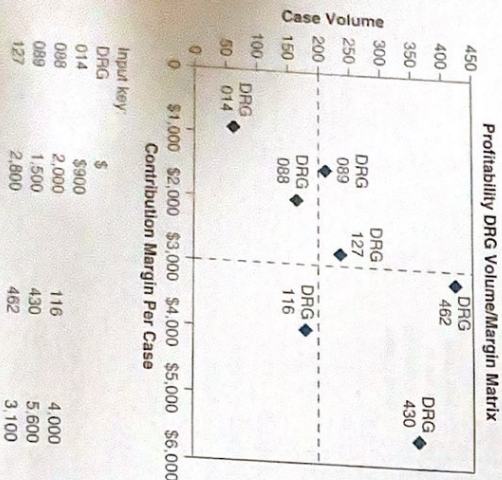


Figure 8-8 Profitability DRG Volume/Margin Matrix. Modified from R. Horvath and J. Baker, *Management Accounting for Health Care Organizations* (Sudbury, MA: Jones & Bartlett, 2004), 189.

Scatter Graph Method

In performing a mixed-cost analysis, the manager is attempting to find the mixed cost's average rate of variability. The scatter graph method is more accurate than the high-low method previously described. It uses a graph to plot all points of data, rather than the highest and lowest figures used by the high-low method. Generally, cost will be on the vertical axis of the graph, and volume will be on the horizontal axis. All points are plotted, each point being placed where cost and volume intersect for that line item. A regression line is then fitted to the plotted points. The regression line basically represents the average—or a line of averages. The average total fixed cost is found at the point where the regression line intersects with the cost axis.

Two examples are examined. They match the high-low examples previously calculated. Figure 8-9 presents the cafeteria data. The costs for cafeteria meals have been plotted on the graph, and the regression line has been fitted to the plotted data points. The regression line strikes the cost axis at a certain point; that amount represents the fixed cost portion of the mixed cost. The balance (or the total less the fixed cost portion) represents the variable portion.

The second example also matches the high-low example previously calculated. Figure 8-10 presents the drug sample data. The costs for drug samples have been plotted on the graph, and the regression line has been fitted to the plotted data points. The regression line again strikes the cost axis at the point representing the fixed-cost portion of the mixed cost. The balance (the total less the fixed cost portion) represents the variable portion. Further discussions of this method can be found in Examples and Exercises at the back of this book.

The examples presented here have regression lines fitted visually. However, computer programs are available that will place the regression line through statistical analysis as a function of the program. This method is called the least-squares method. Least squares means that the sum of the squares of the deviations from plotted points to regression line is smaller than would occur from any other way the line could be fitted to the data; in other words, it is the best fit. This method is, of course, more accurate than fitting the regression line visually.

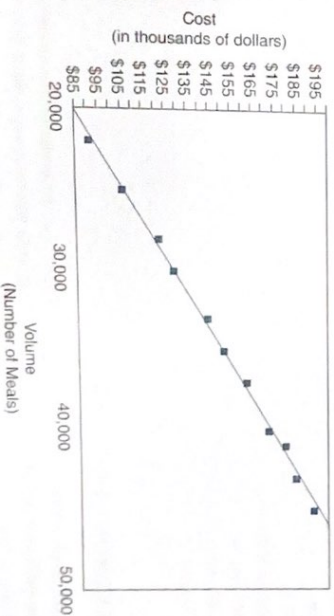


Figure 8-9 Employee Cafeteria Scatter Graph.

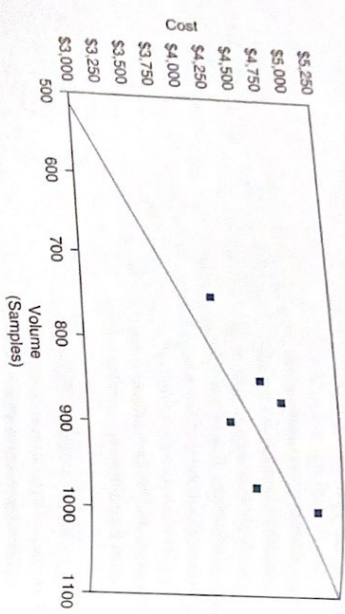


Figure 8-10 Drug Sample Scatter Graph for November.

1 INFORMATION CHECKPOINT

What is needed?
 Where is it found?
 How is it used?

Revenues, variable cost, and fixed cost for a unit, division, DRG, and so on.
 In operating reports.
 Use the multiple-step calculations in this chapter to compute the CPV or the PV ratio; use to plan and control operations.

KEY TERMS

- Break-Even Analysis
- Cost-Profit-Volume
- Contribution Margin
- Fixed Cost
- Mixed Cost
- Profit-Volume Ratio
- Semi-fixed Cost
- Semi-variable Cost
- Variable Cost

? DISCUSSION QUESTIONS

1. Have you seen reports in your workplace that set out the contribution margin?
2. Do you believe that contribution margins can help you manage in your present work? In the future? How?
3. Have you encountered break-even analysis in your work?

4. If so, how was it used (or presented)?
5. How do you think you would use break-even analysis?
6. Do you believe your organization could use these analysis tools more often than is now happening? What do you believe the benefits would be?

NOTES

1. C. Horngren et al., *Cost Accounting: A Managerial Emphasis*, 9th ed. (Englewood Cliffs, NJ: Prentice Hall, 1998).
2. J. J. Baker, *Activity-Based Costing and Activity-Based Management for Health Care* (Gaithersburg, MD: Aspen Publishers, Inc., 1998).
3. It is possible that the term "diagnosis-related groups" (DRGs) may be changed to some new terminology as a consequence of ICD-10 implementation.