

Part Four

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A Brief Introduction to Cost Accounting

Organizations and managers are almost always interested in and concerned about costs. Control of past, present, and future costs is part of every manager's job. In companies that try to earn profits, control of costs directly affects the amount of profit earned. Knowledge of the cost of products or services is indispensable for decisions about pricing or product and service mix. In nonprofit organizations, control of costs influences the level of services that can be provided and the future survival of the organization.

Cost accounting systems can be important sources of information for managers. For this reason, effective managers understand the strengths and limitations of cost accounting systems and actively participate in the evaluation and evolution of cost measurement and management systems. Unlike accounting systems that support the preparation of periodic financial reports, cost accounting systems and reports are not subject to rules or standards such as generally accepted accounting principles. Managers are permitted to exercise as much creativity and ingenuity as they wish in the quest for information or costs. As a result, there is much variety in cost accounting systems used in different companies and sometimes even in different parts of the same organization.

This brief introduction to cost accounting will review the principal uses of cost data, provide some vocabulary for cost accounting, and present several of the questions managers have to answer in designing or using a cost accounting system. Its purpose is to provide the beginner with some vocabulary and ideas to use in learning about and exploring how cost management systems are designed and used by managers. While many of the references are to products and manufacturing environments, the vocabulary and concepts are equally applicable to services.

SOME USES OF INFORMATION ABOUT COSTS

Information about costs is used for two purposes in most organizations. Cost accounting systems provide information for evaluating the performance of an organizational unit or its manager. They also provide a means for estimating the costs of units of product or service that the organization may manufacture or provide to others.

Performance Measurement

Reports on the costs incurred by part of an organization—department or a division, for example—are one means by which efficiency and effectiveness can be evaluated. By comparing *actual costs* to those that were expected—to *standard costs* or *budgeted costs*—the degree to which costs have been controlled can be judged. Deviations from expectations—*variances*—can be identified, evaluated, and discussed by managers. If needed, corrective actions can be taken or expectations can be modified to incorporate previously unexpected efficiencies.

Performance measurement reporting is usually periodic and systematic. Costs are assigned to parts of an organization that are identified as *cost centers*. When managers are held accountable for the costs incurred in a cost center, they are sometimes called *responsibility centers*. Performance reports provide information on the achievement of established objectives, efficiency of operations, and opportunities for cost control or cost reduction. Performance reports are used for both information and performance measurement and evaluation.

Product Costs and the Cost of Services

Inventory cost In manufacturing companies, product costs must be measured to determine the cost of items transferred from work-in-process to finished goods inventory. To satisfy the demands created by the *cost concept* used in financial reporting, a cost accounting system must measure all of the costs of the manufacturing process and assign some part of those costs to each unit of product. The costs of obtaining, maintaining, and managing the manufacturing facility need to be added to the costs of material and productive labor that each unit requires. The former costs are called *indirect costs*, and the latter are called *direct costs*. Generally accepted accounting principles require that inventory cost includes a “fair share” of total manufacturing costs, including indirect costs. In practice, there is considerable variation in how indirect costs are assigned to products.

Profitability analysis Information on costs is indispensable for analyzing the profitability of a product or product line. Product cost information allows managers to evaluate *contribution margin*—the difference between price and variable costs—and *gross margin*—the difference between price and total product costs. Information about sales, marketing, and distribution costs allows

managers to evaluate the profitability of a product or product line. Without good information about costs, managers have no way to associate net income with actions or products about which they make decisions and over which they exercise control.

Product mix In companies that offer more than one product or service, information about costs is a key to managing the mix of products or services offered to customers or clients. With cost and profitability information, a manager can direct sales and marketing effort to the most profitable products. Unprofitable products can be eliminated, repriced, or bundled with more profitable products. The importance of product line decisions to future profitability requires confidence that product costs have been accurately determined.

Pricing Although prices are determined by market forces of supply and demand, product differentiation and marketing offer many managers some degree of latitude in setting prices. Product costs and trends in product costs often provide signals to managers that prices should be changed. In particular, a change in the cost of a critical material or component may signal the need to reconsider the prices asked for products.

Cost of service Many products require the seller to provide additional services to customers. In such cases, information about the cost of services is as important to managers as product costs. The same is true for managers of companies or organizations that provide only services. Unless the cost of service is measured, there is no way to know if providing the service is profitable or not and whether changes in pricing or marketing strategy are needed.

COST BEHAVIOR

Basic knowledge about cost behavior is a prerequisite for understanding, using, or designing cost accounting or cost management systems. The level of cost can be a function of either or both the *volume* of activity or *time* when the cost is incurred. Because prices of material, labor, and other resources change as time passes, and because time allows changes in manufacturing methods or service delivery, comparing costs at two points in time can be informative about efficiency. However, understanding the effect of changes in volume on costs is essential to measuring, analyzing, and using information about costs for both performance measurement and product costing.

Relation of Costs to Volume

If a company changes the amount of product or service it provides to customers or clients, its total costs will usually change as well. If more product is manufactured and sold, then we should expect the higher volume to cause costs to in-

crease. However, in many instances the increase in costs will not be proportional to the increase in product volume. To understand why, the concepts of *variable costs* and *fixed costs* must be understood.

Variable costs A cost which changes in strict proportionality with volume is called a variable cost. That is, if volume increases by 50%, a variable cost will increase in total by 50% as well. Materials used to create a product are a common example of a variable cost item. The total cost of materials to manufacture 20 units is double the cost to manufacture 10 units.

Nonvariable costs A cost that does not vary at all with volume is called a nonvariable, or fixed, cost. Over time, the level of a fixed cost may change, but the change is independent of the volume of activity. Building rent is usually a nonvariable cost. The rent paid is independent of the number of units of product or service produced in the building or the number of customers served. Nonvariable costs can often be changed by management decisions, but they do not change simply because the volume of activity changes.

Semivariable costs Many costs include a combination of variable costs and nonvariable costs. The total amount of these costs varies in the same direction as volume, but less than proportionately with changes in volume. Sometimes semivariable costs can be separated into a fixed portion and a variable portion by isolating elements of the cost. The total cost of driving an automobile is semivariable with respect to the number of miles driven, but the cost of gasoline, oil, tires, and maintenance may be variable, whereas insurance and registration fees are probably fixed.

Chunky costs Often costs are assumed to be variable when they actually are incurred in chunks. Such costs, also known as *step-function costs*, are fixed for a range of volume of production but change in a chunk when volume drops below or exceeds the limits of the *relevant range* of volume. The costs of stockroom employees are often chunky. As volume of inventory or products increases, one stockroom employee may be able to handle material and finished goods until the volume level increases to the point where another employee must be added. The new staffing level will then be sufficient even as volume rises further until another "step" is reached. Chunky costs and costs that are not easily related to volume measures usually require special analysis and management.

ACCOUNTING FOR COSTS

Classifying Costs

The word *cost* is used many different ways in accounting and by managers. For clarity, other words are often attached to the word *cost* to enhance its meaning. In cost accounting, costs are usually classified into two categories: direct costs and indirect costs.

Direct costs Direct costs can be specifically traced to or are caused by a product, project, organizational unit, or activity. Materials specifically used in the manufacture of a product are an example of a direct cost. Labor specifically employed to provide a service would be another example. Many direct costs are variable costs, but nonvariable costs can also be direct costs if they can be traced directly to a project, organizational unit, or activity.

Indirect costs When a cost cannot be traced directly to a single product, project, organizational unit, or activity, it is classified as an indirect cost. The rental cost of a factory building making more than one product is an indirect cost with respect to each product. There is no feasible way to associate specifically an indirect cost with an individual unit or batch of products.

Indirect costs are included in *overhead cost*, or *burden*. To account for the full cost of manufacturing products, some portion of the overhead cost must be associated with each unit of product. The methods by which overhead costs are associated with products or services comprise the essence of most cost accounting systems.

Accounting for Direct Costs

A simplified cost flow chart for a manufacturing company is shown in Exhibit 1. Resources are acquired for cash or on credit and are classified as materials, payroll, or overhead. Payroll which is classified as indirect cost, becomes part of overhead. In the production process, material, labor, and overhead cost becomes the cost of work-in-process inventory. When completed, work in process becomes finished goods and, later, cost of goods sold.

It is easy to understand the accounting for direct costs such as material and productive labor. As material is converted to product by the effort of production labor, the costs of material used and labor can be associated with products. As products are completed and transferred to finished goods and cost of goods sold, these direct costs are transferred with them. All the cost accountant has to do is keep track of how much material and labor cost is used in producing each unit of product. (Actually, this is a little more complicated than it may sound here, but this brief description captures the essence of the accounting process for these direct costs.)

Accounting for Indirect Costs

Accounting for indirect costs is more complicated than accounting for direct costs. Costs must be collected and associated with activities before they can be assigned to products. The relationship between expenditures or costs and products or services is often far from obvious. Assignment to activities is often based on arbitrary decisions about the possible relationships between the rea-

son for an expenditure and an activity. For example, rent for a building that houses both manufacturing and sales activities might be assigned to each activity in the same ratio as the floor space occupied by each. Then, the manufacturing rent cost may be assigned to products manufactured using a measure of volume or some other measure of effort or activity.

Almost all cost accounting systems use a two-stage procedure for assigning indirect costs to products or other *cost objects*. First, costs are assigned to cost centers, or *cost pools*. Second, costs are assigned from each pool to products, using *cost drivers*. The concept of a cost driver is based on the idea that products drive the consumption of resources.

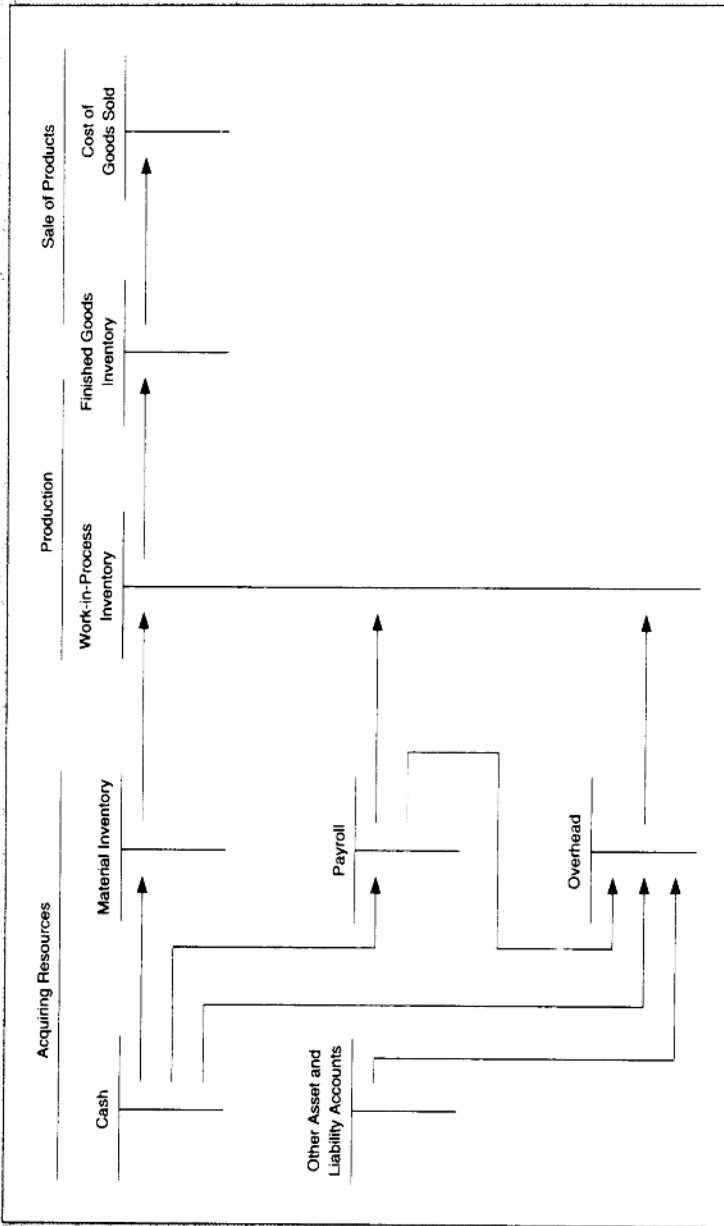
The first question that the cost accounting system designer has to answer concerns how many cost centers to use. Using more cost centers than necessary adds complexity and cost to the cost accounting process itself. But using too few cost pools can create a risk that assigned costs will have little relationship to the activities and products that caused the cost to be incurred and resources to be consumed. In a manufacturing plant, the number of cost pools needed may be as small as one if machines, labor, and products are homogeneous, or the number needed may be much larger if there is greater diversity in activities or products. In some manufacturing plants, each department, or even each machine, may be treated as a separate cost center.

The second set of questions the cost accounting system designer has to answer concerns how to assign costs to each cost center or cost pool. Expenditures for indirect costs may be assigned based on direct labor cost, floor space, headcounts, or direct costs. More complex systems will attempt to implement as much direct charging to each cost pool as possible by using actual measures of the resources used by each cost center.

The third set of questions the cost accounting system designer has to answer concerns how to assign the costs collected for each cost center to the products that are manufactured by or pass through that center. Often the costs are assigned in proportion to the use of a resource that is easily measured. Each unit product may be assigned the same proportion of indirect cost as it consumes labor time, labor cost, machine time, or material cost, for example.

Given the number and complexity of choices facing the cost accounting system designer and the fact that there are no constraining "generally accepted principles of cost accounting," it should be obvious that there is great diversity in the cost accounting systems used by different organizations. A new manager or employee has no choice but to learn about the systems the company uses before using the cost information the system has produced. Every manager has to be continually alert to be sure the cost information available is the right information for the decision or task at hand.

EXHIBIT 1
Cost Flow Chart for a Manufacturing Company



Hilton Manufacturing Company

In February 1991, George Weston was appointed general manager by Paul Hilton, president of Hilton Manufacturing Company. Weston, age 56, had wide executive experience in manufacturing products similar to those of the Hilton Company. The appointment of Weston resulted from management problems arising from the death of Richard Hilton, founder and, until his death in early 1990, president of the company. Paul Hilton had only four years' experience with the company, and in early 1991 was 34 years old. His father had hoped to train Paul over a 10-year period, but the father's untimely death had cut short this seasoning period. The younger Hilton became president after his father's death and had exercised full control until he hired Mr. Weston.

Paul Hilton knew that he had made several poor decisions during 1990 and that the morale of the organization had suffered, apparently through lack of confidence in him. When he received the 1990 income statement (**Exhibit 1**), the loss of almost \$200,000 during a good year for the industry convinced him that he needed help. He attracted Weston from a competitor by offering a stock option incentive in addition to salary, knowing that Weston wanted to acquire financial security for his retirement. The two men came to a clear understanding that Weston, as general manager, had full authority to execute any changes he desired. In addition, Weston would explain the reasons for his decisions to Mr. Hilton and thereby train him for successful leadership upon Weston's retirement.

Hilton Manufacturing Company made only three industrial products, 101, 102, and 103, in its single plant. These were sold by the company sales force for use in the processes of other manufacturers. All of the sales force, on a sal-

ary basis, sold the three products but in varying proportions. Hilton sold throughout New England, where it was one of eight companies with similar products. Several of its competitors were larger and manufactured a larger variety of products. The dominant company was Catalyst Company, which operated a plant in Hilton's market area. Customarily, Catalyst announced prices, and the other producers followed suit.

Price cutting was rare; the only variance from quoted selling prices took the form of cash discounts. In the past, attempts at price cutting had followed a consistent pattern; all competitors met the price reduction, and the industry as a whole sold about the same quantity but at the lower prices. This continued until Catalyst, with its strong financial position, again stabilized the situation following a general recognition of the failure of price cutting. Furthermore, because sales were to industrial buyers and the products of different manufacturers were similar, Hilton was convinced it could not unilaterally raise prices without suffering volume declines.

During 1990, Hilton's share of industry sales was 12 percent for type 101, 8 percent for 102, and 10 percent for 103. The industry-wide quoted selling prices were \$9.41, \$9.91, and \$10.56, respectively.

Weston, upon taking office in February 1991, decided against immediate major changes. Rather, he chose to analyze 1990 operations and to wait for results of the first half of 1991. He instructed the accounting department to provide detailed expenses and earnings statements by products for 1990 (see **Exhibit 2**). In addition, he requested an explanation of the nature of the costs including their expected future behavior (see **Exhibit 3**).

To familiarize Paul Hilton with his methods, Weston sent copies of these reports to Hilton, and they discussed them. Hilton stated that he thought product 103 should be dropped immediately as it would be impossible to lower expenses on product 103 as much as 83 cents per hundredweight (cwt.). In addition, he stressed the need for economies on product 102.

Weston relied on the authority arrangement Hilton had agreed to earlier and continued production of the three products. For control purposes, he had the accounting department prepare monthly statements using as standard costs the actual costs per cwt. from the 1990 profit and loss statement (**Exhibit 2**). These monthly statements were his basis for making minor marketing and production changes during the spring of 1991. Late in July 1991, Weston received from the accounting department the six months' statement of cumulative standard costs including variances of actual costs from standard (see **Exhibit 4**). They showed that the first half of 1991 was a successful period.

During the latter half of 1991, the sales of the entire industry weakened. Even though Hilton retained its share of the market, its profit for the last six months would be small. For January 1992, Catalyst announced a price reduction on product 101 from \$9.41 to \$8.64 per cwt. This created an immediate pricing problem for its competitors. Weston forecast that if Hilton Manufactur-

ing Company held to the \$9.41 price during the first six months of 1992, its unit sales would be 750,000 cwt. He felt that if Hilton dropped its price to \$8.64 per cwt., the six months' volume would be 1,000,000 cwt. Weston knew that competing managements anticipated a further decline in activity. He thought a general decline in prices was quite probable.

The accounting department reported that the standard costs in use would probably apply during the first half of 1992, with two exceptions: materials and supplies would be about 5 percent above standard; and light and heat would increase about 7 percent.

Weston and Hilton discussed the product 101 pricing problem. Hilton observed that especially with the anticipated increase in materials and supplies costs, a sales price of \$8.64 would be below cost. He therefore wanted to hold the price at \$9.41, since he felt the company could not be profitable while selling a key product below cost.

QUESTIONS

1. If the company had dropped product 103 as of January 1, 1991, what effect would that action have had on the \$158,000 profit for the first six months of 1991?
2. In January 1992, should the company reduce the price of product 101 from \$9.41 to \$8.64?
3. What is Hilton's most profitable product?
4. What appears to have caused the return to profitable operations in the first six months of 1991?

EXHIBIT 1

Hilton Manufacturing Company, Income Statement for Year Ending December 31, 1990

Gross sales		\$40,690,234
Cash discount		<u>622,482</u>
Net sales		40,067,752
Cost of sales		<u>25,002,386</u>
Gross margin		15,065,366
Less: Selling expense	\$7,058,834	
General administration	2,504,597	
Depreciation	<u>5,216,410</u>	<u>14,779,841</u>
Operating income		285,525
Other income		<u>78,113</u>
Income before interest		363,638
Less: interest expense		<u>555,719</u>
Income (loss)		<u>\$ (192,081)</u>

EXHIBIT 2**Hilton Manufacturing Company, Analysis of Profit and Loss by Product, Year Ended December 31, 1990**

	Product 101		Product 102		Product 103		Total
	Thou- sands	\$ per Cwt.	Thou- sands	\$ per Cwt.	Thou- sands	\$ per Cwt.	Thousands
Rent	721	0.3383	603	0.5856	718	0.7273	2,042
Property taxes	240	0.1125	192	0.1862	153	0.1555	585
Property insurance	201	0.0941	153	0.1486	202	0.2047	556
Compensation insurance	317	0.1486	167	0.1620	172	0.1747	656
Direct labor	4,964	2.3282	2,341	2.2740	2,640	2.6746	9,945
Indirect labor	1,693	0.7941	814	0.7903	883	0.8947	3,390
Power	86	0.0403	96	0.0929	116	0.1171	298
Light and heat	57	0.0269	49	0.0472	39	0.0392	145
Building service	38	0.0180	30	0.0288	28	0.0288	96
Materials	2,935	1.3766	1,809	1.7572	1,862	1.8862	6,606
Supplies	201	0.0941	183	0.1774	135	0.1363	519
Repairs	<u>68</u>	<u>0.0319</u>	<u>57</u>	<u>0.0557</u>	<u>39</u>	<u>0.0396</u>	<u>164</u>
Total	11,522	5.4036	6,493	6.3059	6,986	7.0787	25,002
Selling expense	3,496	1.6397	1,758	1.7069	1,805	1.8286	7,059
General administration	1,324	0.6209	499	0.4850	681	0.6904	2,505
Depreciation	2,169	1.0172	1,643	1.5955	1,404	1.4223	5,216
Interest	<u>201</u>	<u>0.0941</u>	<u>153</u>	<u>0.1490</u>	<u>202</u>	<u>.2043</u>	<u>556</u>
Total cost	18,711	8.7755	10,546	10.2423	11,078	11.2243	40,338
Less other income	<u>39</u>	<u>0.0184</u>	<u>20</u>	<u>0.0192</u>	<u>19</u>	<u>0.0192</u>	<u>78</u>
Sales (net)	18,672	8.7571	10,526	10.2231	11,059	11.2051	40,260
	<u>19,847</u>	<u>9.3084</u>	<u>9,977</u>	<u>9.6900</u>	<u>10,243</u>	<u>10.3784</u>	<u>40,068</u>
Profit (loss)	<u>1,175</u>	<u>0.5513</u>	<u>(549)</u>	<u>(0.5331)</u>	<u>(816)</u>	<u>(0.8267)</u>	<u>(192)</u>
Unit sales (cwt.)	2,132,191		1,029,654		986,974		
Quoted selling price	\$9.41		\$9.91		\$10.56		
Cash discounts taken, percent of selling price	1.08%		2.22%		1.72%		

Note: Figures may not add exactly because of rounding.

EXHIBIT 3**Accounting Department's Commentary on Costs**

<i>Direct Labor:</i>	Variable. Nonunion shop at going community rates. No abnormal demands foreseen. It may be assumed that direct labor dollars is an adequate measure of capacity utilization.
<i>Compensation insurance:</i>	Variable. Five percent of direct and indirect labor is an adequate estimate.
<i>Materials:</i>	Variable. Exhibit 2 figures are accurate. Includes waste allowances.
<i>Power:</i>	Variable. Rates are fixed.
<i>Supplies:</i>	Variable. Exhibit 2 figures are accurate.
<i>Repairs:</i>	Variable. Varies as volume changes within normal operating range. Lower and upper limits are fixed.
<i>General administrative, selling expense, indirect labor, interest:</i>	Almost nonvariable. Can be changed by management decision.
<i>Cash discount:</i>	Almost nonvariable. Average cash discounts taken are consistent from year to year. Percentages in Exhibit 2 are accurate.
<i>Light and heat:</i>	Almost nonvariable. Heat varies only with fuel cost changes. Light is a fixed item regardless of level of production.
<i>Property taxes:</i>	Almost nonvariable. Under the lease terms, Hilton Manufacturing Company pays the taxes; assessed valuation has been constant, the rate has risen slowly. Any change in the near future will be small and independent of production volume.
<i>Rent:</i>	Nonvariable. Lease has 12 years to run.
<i>Building service:</i>	Nonvariable. At normal business level
<i>Property insurance:</i>	Nonvariable. Three-year policy with fixed premium.
<i>Depreciation:</i>	Nonvariable. Fixed dollar total.

EXHIBIT 4
Hilton Manufacturing Company, Profit and Loss by Product, at Standard, Showing Variances from
January 1 to June 30, 1991

Item	Product 101			Product 102			Product 103			Total Actual (thousands)	Variances
	Standard per Cwt.	Total at Standard	Standard per Cwt.	Total at Standard	Standard per Cwt.	Total at Standard	Standard per Cwt.	Total at Standard			
Rent	0.3383	337	0.5856	417	0.7273	365	0.7273	1,119	1,021	+ 98	
Property taxes	0.1125	112	0.1862	133	0.1555	78	0.1555	323	307	+ 16	
Property insurance	0.0941	94	0.1486	106	0.2047	103	0.2047	302	278	+ 24	
Compensation insurance	0.1486	148	0.1620	115	0.1747	88	0.1747	351	348	+ 3	
Direct labor	2.3282	2,321	2.2740	1,619	2.6746	1,341	2.6746	5,281	5,308	- 27	
Indirect labor	0.7941	792	0.7903	563	0.8947	448	0.8947	1,803	1,721	+ 82	
Power	0.0403	40	0.0929	66	0.1171	59	0.1171	165	170	- 5	
Light and heat	0.0269	27	0.0472	34	0.0392	20	0.0392	80	83	- 3	
Building service	0.0180	18	0.0288	21	0.0288	14	0.0288	53	50	+ 3	
Materials	1.3766	1,372	1.7572	1,251	1.8862	946	1.8862	3,569	3,544	+ 25	
Supplies	0.0941	94	0.1774	126	0.1363	68	0.1363	288	288	—	
Repairs	0.0319	32	0.0557	40	0.0396	20	0.0396	91	88	+ 3	
Total production cost	5.4036	5,387	6.3059	4,490	7.0787	3,548	7.0787	13,425	13,206	+ 219	
Selling expense	1.6397	1,635	1.7069	1,215	1.8286	917	1.8286	3,767	3,706	+ 62	
General administration	0.6209	619	0.4850	345	0.6904	346	0.6904	1,310	1,378	- 68	
Depreciation	1.0172	1,014	1.5955	1,136	1.4223	713	1.4223	2,863	2,686	+ 177	
Interest	0.0941	94	0.1490	106	0.2043	102	0.2043	302	290	+ 12	
Total cost	8.7755	8,748	10.2423	7,294	11.2243	5,626	11.2243	21,668	21,266	+ 402	
Less other income	0.0184	18	0.0192	14	0.0192	10	0.0192	42	42	—	
Actual sales (net)	8.7571	8,730	10.2231	7,280	11.2051	5,617	11.2051	21,626	21,224	+ 402	
	9.3084	9,279	9.6900	6,900	10.3784	5,202	10.3784	21,382	21,382	—	
Profit or loss	0.5513	550	(0.5331)	(380)	(0.8267)	(414)	(0.8267)	(244)	158	+ 402	
Unit Sales (cwt.)	996,859		712,102		501,276						

Note: Figures may not add exactly because of rounding.

NOTES

Accounting for Indirect Costs

When resources are used in the process of creating a product or service, but a causal linkage between the use of resources and the product or service cannot be established, *indirect costs* are incurred. Indirect costs are not assigned directly to a cost object.

The goal in accounting for indirect costs is to select cost centers and bases of allocation that will relate resource consumption to products or services accurately. Achieving this goal is usually impossible. A more practical objective is to try to measure costs well enough that the information produced is good enough to improve the quality of decisions about pricing, product design, and product mix and to reduce the possibility of mistakes or errors.

In most cost accounting systems, indirect costs are budgeted in advance, and predetermined overhead allocation rates are calculated. Then, as production takes place, indirect costs are applied to (or absorbed into) cost objects. Determining a predetermined overhead rate involves selecting the *cost centers* (or *cost pools*) into which costs will be placed, estimating the total cost to be incurred in each cost center, and choosing cost drivers to allocate resource costs to cost objects.

Predetermined overhead rates are usually used, rather than actual overhead rates, for three reasons:

1. Predetermined overhead rates permit indirect costs to be applied to cost objects at the same time direct costs are applied, rather than waiting for the end of the accounting period;
2. Predetermined overhead rates provide anticipated product or service cost information that can be used in pricing or product-line decisions; and