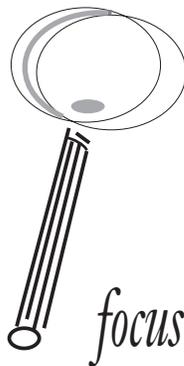


1

Cost Accounting for Control



Learning Objectives

By the end of this chapter, you should be able to:

- Discuss the role of management accounting in an organization.
- List the basic elements of a traditional accounting control system.
- Explain the variances obtained through a traditional cost accounting system.
- Describe the changes that have occurred in manufacturing over the past twenty years.
- Explain why traditional cost systems fail.
- List the factors that may indicate that a company's cost-accounting system is obsolete.

In the latter years of the nineteenth century, U.S. businesses were world leaders in their respective industries. The emphasis for accounting was to provide cost information to management. The emphasis shifted to external users after the stock market crash in 1929 and the ensuing government regulations (e.g., the Securities and Exchange Act of 1934). It was assumed that the information needed for external financial reporting was also useful for internal decision making. Changing technology and the business environment in the decades after World War II challenged this assumption. Activity-based costing was developed to refine traditional cost systems to provide better information for management decision making.

Today's business environment is much more competitive than yesterday's—from both a national and an international perspective. Customers want high-quality products at low prices. Scientific and technological progress within a global environment means not only that the players in the

game change but also that the game itself changes. The current leading player in the game may find that all of a sudden new and stronger competitors are taking the game over or that the game is not being played anymore—that it has been replaced by a new game.

Continuing to be a major player requires constant adjustments. The products must be improved or new products must be produced. Productivity must be improved so that costs are reduced and prices remain competitive. Research and development activities are essential. Distribution costs must be reduced. Unproductive activities must be curtailed or, better yet, eliminated. Management philosophies such as just-in-time and total quality management may need to be implemented to stay abreast of competitors.

James Brimson (1991, p. 4) states that to maintain a competitive advantage, companies must have an information system that provides answers to the following questions:

1. What are the influenceable (and directly traceable) costs and profits for each major product line and customer?
2. What are the cost behavior patterns of each activity, including its capacity, and how much can volume be increased or decreased before costs change?
3. What is the waste (nonvalue-added) component of cost, and what are the best methods for performing an activity?
4. How does overhead cost vary with changes in business? What costs are avoidable if volume declines?
5. How do the current cost structure, capacity utilization, and nonfinancial performance trends compare with those of competitors?
6. How can low cost be designed into new and existing products?

Activity-based costing, which is the subject of this course, is designed to allow analysis of a company's activities in terms of cost and performance.

STRATEGIC PLANNING

Strategic planning is concerned with the long-term goals and objectives of an organization. These goals might include being the leader in a specified industry, maximizing the value of the company's stock, or contributing in a significant way to the well-being of society. The attainment of these goals depends on the achievement of numerous overall objectives concerning targets for such factors as market share, earnings per share, product quality, technological advancement, customer satisfaction, production efficiency, and environmental control. Strategic planning involves decisions relating to capital expenditures, dividend policy, debt and equity financing, and acquisitions and disposals of companies or divisions.

Strategic planning is carried out by top management. In many organizations, the controller is a member of top management and consequently is involved in this process. Because strategic planning is concerned with what the organization should do, it is imperative that the resulting policies be

clearly stated and communicated throughout the organization. Strategic planning provides the foundation for other, shorter-term, planning (e.g., a one-year budget).

Strategic planning is affected by external forces. Opportunities arise to develop new products and technology or to enter new markets; adjustments are needed due to changes in consumer tastes, competition, or government regulations. Top management considers these opportunities in conjunction with the company's resources and attributes to formulate plans to accomplish its objectives. Volatile environmental conditions emphasize the importance of the strategic planning process; stable environmental conditions require little strategic planning.

The management control system influences the behavior of the people in the organization. This behavior should be congruent with the entity's strategic planning and, therefore, the overall goals and objectives.

Accounting information systems play a key role in the strategic planning process and the management control process. Accounting provides such information as revenues, market shares, production and other costs, profit margins, long-term obligations, variances from plans, income, interest costs, and financial forecasts. Activity-based costing is an important element for management control.

The demand for corporate activities consumes resources. Accountants call these consumed resources *costs* or *expenses*. Activity-based costing links the consumption of resources with the related activities and then assigns the associated costs to cost objects such as products. Activity-based management is a related model that is useful in aligning the financial and nonfinancial results of activities with strategic objectives or goals.

ROLE OF MANAGEMENT ACCOUNTING

An accounting system may be either a major information system within the organization or a subsystem of a management information system. Information can be defined as data that have the potential to be useful for influencing decisions—that is, the information is not random. All these systems and subsystems operate to aid the organization in achieving its purpose.

An accounting system aids an organization in the achievement of its purpose by providing information on whether actual achievements have matched financial and nonfinancial expectations. An accounting system serves not only the organization but also a larger system—society—through the issuance of reports to stockholders, government agencies, and other outside parties. Accounting systems are dichotomous. One phase of an accounting system serves primarily external users and is called *financial accounting*. The other phase serves primarily decision makers within the organization (internal users) and is called *management accounting*. Financial, quantitative, and nonquantitative information is provided to decision makers by management accounting systems. Each group of users has its own special needs, and those needs are dealt with in different ways.

The term *management* refers not only to the group of people who plan, direct, and control the activities of an organization, but also to the function itself. Managers do provide the focus for the organization, but the necessities of management itself require that information flow to and from all levels of the organization. Management's needs are not confined to any particular time, place, or group.

It is not enough to say that management accounting is internal accounting. Management accounting exists to help an organization achieve its purpose. It does not stand on its own; it is a service for meeting the needs of management. These needs must be determined before the process of management accounting can be defined.

In a very real sense, every organization has its own purpose, its own set of goals and objectives. While accountants are free to debate what the goals of an organization should be, they should not make assumptions about the goals of the organization they serve. It is the function of managers to establish goals and objectives; it is the function of accountants to help in achieving them.

A number of possible conditions can affect the work of management accounting. Different goals require different decision models, which can be affected by the environment. It may be assumed that the organization operates in a particular environment and that this circumstance is then reflected in the decision process used. Should the actual environment be either significantly more stable or more volatile, the models may not meet the organization's needs. Therefore, the applicability of the models being used must be reevaluated periodically.

The management accountant must know the organization very well before any attempt is made to meet its needs. Research, not assumptions, should be the basis for what the management accountant does. In fact, this research should be a constant process. The task of learning what purpose and needs really are is not simple, and both purpose and needs may change. Accountants can never know these things perfectly, but they can learn them reasonably well.

A good accounting system can be readily adapted to meet changing demands. If, for example, the environment becomes more volatile, the users of the system still should be able to use the system in a meaningful way. Sometimes processes that are commonly used as basic operating procedures must be bypassed to meet the current necessities. At times, a department within an organization may require changes in the way it alone is served by the accounting system. In such a circumstance, the accounting subsystem for that department must be able to be changed without changing the entire system. For example, a company may have implemented a just-in-time system. One of its key suppliers calls to inform the company that it can no longer supply the needed materials. The company is unable to obtain the desired amount of materials in the short run and may have to curtail production or change the production process significantly. Can the accounting system adapt immediately to this new situation?

The accounting system must serve a multitude of needs. Some of these needs are structured and consist of routine reports for internal and external purposes; some are unstructured and respond to special needs. The structured needs can be met by deliberate planning. The unstructured needs must be met by maintaining an appropriate data base and establishing a means of using that base to meet a variety of requests. A data base contains material at an elementary level to allow for the creation of the needed information. It may be stored in a single location or in various locations.

Information relates to a decision, but the decision is made by someone other than the designer of the accounting system. The accountant may surmise what is and is not information but only careful study can verify whether the data are useful for making a decision. Information lies in the perception of the user. Therefore, it is important to realize that the accounting system is not only an information system but also a communication system. Unless data are available to be communicated, they cannot become information.

THE TRADITIONAL ACCOUNTING CONTROL SYSTEM

The traditional accounting control system has the following basic elements:

1. Defining the goal of the subunit (e.g., a division of a company or a functional activity within a governmental unit)
2. Delineating the performance indicators established to ascertain whether operations have been carried out effectively (e.g., market share, rate of return on investment, or budget overruns)
3. Establishing standards of performance
4. Performing the activity
5. Measuring the results of the operations performed
6. Comparing the actual results with the standards in order to measure deviations or variances in performance
7. Communicating the results and analyzing significant variances

The goal or goals of the subunit must be congruent with those of the total unit. When they are, progress toward the standards of the performance indicators of the subunit enhances the overall operations of the organization. Obviously, those performance indicators must truly measure desired performance.

Standards may be developed through such processes as time and motion studies, statistical studies, and subjective estimates of the relationships between various inputs and outputs. Some standards are more difficult to estimate than others, which means that performance evaluation may vary considerably in accuracy. A deviation from standard may reflect a problem with the standard rather than with performance. Performance evaluation can be no better than the standards used and, of course, the accuracy of the data collected.

Debate arises about the efficacy of the use of data intended for financial reports as part of the control mechanism. Accounting for internal purposes does not have to be bound by generally accepted accounting principles. The sophistication of available computer technology allows data to be collected, analyzed, and reported for a variety of purposes.

Accounting systems have been dominated by the demands of the external users; it is not certain whether this domination results in the best data for management purposes. Basic differences in purpose and philosophy abound, and those differences affect cost and other data critical in each area. Historical costs, for example, have no direct relevance for decision making and, under some environmental conditions, little indirect relevance. Control mechanisms must deal with the realities of both the segments under observation and the relationships of those segments to the whole system. The purpose of financial accounting is to provide information to external users such as investors and creditors about the overall performance and financial condition of the organization. Financial accounting has little need for the detailed relationships necessary in control and does not really address itself to system relationships.

THE BEHAVIORAL ASPECTS OF CONTROL

The ultimate purpose of the control process is to aid the organization in achieving its goals and objectives. The extent and type of control will depend on the type of organization. The classical organization tends to ignore human aspects of control, concentrating on the tasks instead; the neoclassical organization concerns itself with methods of motivation; and the humanist organization approaches control from the direction of human needs. Thus, the type of organization determines much about the type of control to be used.

Motivational Factors

The motivation of organizational personnel depends on the extent to which their goals are satisfied by participation in the organization. Some are able to satisfy their aspiration levels by belonging to a group within the entity, others achieve their personal goals by having discretionary control over the organization's resources, and others experience dissatisfaction through failure to attain their personal goals.

Agreement on overall goals is typically difficult unless the goals are couched in terms so vague as to seemingly embrace a broad spectrum. Even after some agreement on goals has been reached, conflicts between units within the entity are bound to arise due to differing personal and group aspirations. The result is often interdepartmental conflict within the organization.

Many studies have demonstrated that if an organization's overall goals can be refined into operational goals, and if these latter goals then can be translated into group goals, effort and performance are increased. Unfavor-

able consequences may result, however, if goal specification is too highly developed.

If the achievement of the performance indicated by a budget does not satisfy the needs of the manager or worker, he or she will not be motivated by it. An individual will internalize the budget if he or she feels that his or her personal needs will be more satisfied by achieving the budgeted performance than by not achieving it.

No objectives have a significant incentive power when they are incongruent with an individual's underlying aspirations. Congruence of organizational and individual goals is, therefore, important. Many researchers believe that goal congruence is possible with the proper kind of motivation, while others disagree.

Effect of Participation

At the individual level, success and aspiration seem to be positively related; increases in a person's level of aspiration often result in greater success at achieving individual goals. If the individual is a member of a group, his or her aspiration level will depend to some extent on that of the group to which he or she belongs. The group's influence on the individual depends on the cohesiveness of the group—that is, the degree to which the group perceives itself as sharing a common fate. Cohesiveness, in turn, depends on the size of the group (as size increases, subgroup loyalties may develop) and the compatibility of the members. The value of group membership to the individual depends on the extent to which he or she perceives the group to be instrumental in achieving his or her own goals. The individual may, therefore, reject goals that are in conflict with the group's goals and accept those that are consistent, even when the goals of the organization and the group are not congruent.

A positive relationship also seems to exist between participation and performance, due to the increased satisfaction experienced by members of an organization who utilize their capabilities to achieve their objectives. This effect may be due partly to the increased degree of ego involvement resulting from the participation process. In fact, perceived participation may be more important than the actual inputs of the participants. Poorer performance can also result from participation if the members of the organization are reluctant to accept the risk of not achieving their own standards. If participation is attempted in a basically authoritarian setting, it may be mistrusted and, therefore, ineffective.

Many people accept the idea that participation in the budget process leads to better budget performance, but participation does not necessarily accomplish this goal. Some people either cannot or do not wish to participate in the budget process. Others refuse to let a job be anything more than a means to other ends. They will do what they are told to do—and do it well—but they do not want any more involvement in the organization. Some may have difficulty understanding what is needed, others may not be able to communicate effectively, and still others may not have sufficient time available for meaningful participation, which can be very demanding.

In any case, if participation in the process is planned, it should be recognized that extensive preparation is necessary. New perceptions and new perspectives must be created for all parties if the process is to work.

Above all, some minimal level of trust is required at all levels, and that trust must be deserved. Pseudoparticipation can be very unproductive. Unless people believe that their actions have meaning, they will not provide meaningful input, and negative motivation is likely.

THE TRADITIONAL COST ACCOUNTING SYSTEM

Traditional cost accounting systems were designed at a time when the two main components of manufacturing cost were direct materials and direct labor. Manufacturing overhead was a relatively minor component. Direct materials and direct labor are used directly to produce a particular product. Indirect materials and indirect labor, considered to be part of manufacturing overhead (or burden), are used in manufacturing several products—examples include supplies and the cost of labor employed in machine setups or maintenance.

Manufacturing overhead is applied to production based for the most part on direct labor hours and/or machine hours. Excessive direct labor hours or machine hours result in overapplied manufacturing overhead. The manufacturing costs are then allocated to cost of goods sold and inventories. Unit costs are computed by dividing total manufacturing costs for a product by the number of units produced. These unit costs are important (although not the only factor) for determining the selling prices of these products.

Although manufacturing overhead rates could be computed at the end of each period based on actual overhead costs and actual direct labor (or machine) hours, the total unit costs of each product would not be known on a timely basis. Consequently, overhead costs are applied on the basis of predetermined rates using budgeted overhead cost and budgeted direct labor (or machine) hours. These predetermined amounts are set on a yearly basis to avoid the volatility in overhead rates due to seasonal variations or changes in the volume produced due to increases or decreases in demand.

When the business entity is divided into areas of management responsibility—that is, cost centers, profit centers, and investment centers—accounting reports are designed to facilitate comparisons between actual and budgeted amounts for each organizational unit. Management by exception, in which the variances of significant amounts are highlighted, is an important part of this system.

To illustrate this accounting system, assume that the following information is available for a company that produces a single product:

1. Standard direct materials quantity per unit is 7 feet.
2. Standard direct materials cost per foot is \$10.
3. Standard direct labor hours per unit are 5.

4. Standard direct labor cost per hour is \$8.
5. Standard variable overhead cost per direct labor hour is \$6.
6. Standard fixed overhead cost per direct labor hour is \$3.
7. The flexible budget at a predetermined volume of 1,200 units shows the following:

Direct materials (1,200 × 7 × \$10)	\$ 84,000
Direct labor (1,200 × 5 × \$8)	48,000
Variable overhead (1,200 × 5 × \$6)	36,000
Fixed overhead (1,200 × 5 × \$3)	18,000
Total	<u>\$186,000</u>

8. Actual costs for manufacturing 1,000 units are as follows:

Direct materials purchased	8,000 feet at \$10.20 per foot
Direct materials used	7,050 feet
Direct labor	4,900 hours at \$8.30 per hour
Variable overhead	\$31,100
Fixed overhead	\$18,250

The computation of the variances is presented in Exhibit 1-1.

The comparison of actual versus standard shows that there is a net unfavorable variance of \$7,120 for this period of time. The variances are as follows:

- *Materials price variance.* \$1,600 unfavorable because the unit purchase price is more than the standard price
- *Materials quantity variance.* \$500 unfavorable because more materials than the standard amount are used
- *Labor rate variance.* \$1,470 unfavorable because the workers who manufactured this product have a higher rate than the standard
- *Labor efficiency variance.* \$800 favorable because fewer labor hours than standard are used
- *Spending variance.* \$1,700 unfavorable because more cost is incurred for variable overhead than allowed in the flexible budget based on actual direct labor hours
- *Variable overhead efficiency variance.* \$600 favorable because fewer labor hours than standard are used
- *Flexible budget variance.* \$250 unfavorable because actual fixed overhead exceeds the budgeted amount
- *Volume variance.* \$3,000 unfavorable because actual output of 1,000 units is less than the predetermined output of 1,200 units

With the accounting system set up in terms of standard costs, a conversion to actual costs must be made for purposes of presentation in the financial statements. Theoretically, these variances need to be apportioned among work-in-process inventory, finished goods inventory, and cost of goods sold. Often, however, the variances are closed to only cost of goods sold.

**Exhibit 1-1****Variance Analysis in Traditional Cost Accounting System****DIRECT MATERIALS**

<u>Actual Units × Actual Price</u>	<u>Actual Units × Standard Price</u>	<u>Actual Inputs × Standard Price</u>	<u>Flexible Budget— Standard Units × Standard Price</u>
8,000 × \$10.20	8,000 × \$10	7,050 × \$10	7,000 × \$10
	8,000 × \$0.20		50 × \$10
	Price variance \$1,600 unfavorable		Quantity variance \$500 unfavorable

DIRECT LABOR

<u>Actual Hours × Actual Rate</u>	<u>Actual Hours × Standard Rate</u>	<u>Flexible Budget— Standard Hours × Standard Rate</u>
4,900 × \$8.30	4,900 × \$8	5,000 × \$8
	4,900 × \$0.30	100 × \$8
	Rate variance \$1,470 unfavorable	Efficiency variance \$800 favorable

VARIABLE OVERHEAD

<u>Actual</u>	<u>Actual Hours × Standard Rate</u>	<u>Flexible Budget— Standard Hours × Standard Rate</u>
\$31,100	4,900 × \$6	5,000 × \$6
		100 × \$6
	Spending variance \$1,700 unfavorable	Efficiency variance \$600 favorable

FIXED OVERHEAD

<u>Actual</u>	<u>Flexible Budget</u>	<u>Applied</u>
\$18,250	\$18,000	5,000 × \$3
	Flexible budget variance \$250 unfavorable	Volume variance \$3,000 unfavorable

The Development of the Traditional Cost Accounting System

Cost accounting systems were developed to meet the needs of businesses that produced a small number of products, used the same or similar manufacturing processes on each one, and utilized direct labor as the major input. The same production processes were repeated over and over again. Costs were kept low due to increased output, high productivity and efficiency through high utilization of labor, and numerous inspections for defective units. Inven-

tory levels were at rather high levels, because increased output meant lower setup costs and less idle time for the plant's workers.

Materials were purchased in large amounts to obtain quantity discounts. These materials were requisitioned as needed. The workers made the product and, when it was completed, transferred it to the warehouse holding the finished goods inventory. Materials and labor were the direct costs of production; both were considered to be variable costs. Technology was fairly stable. Overhead costs were minor in amount and could be allocated to production on the basis of direct labor hours. Not all the overhead costs were variable—for example, depreciation was an allocated cost, power had a fixed cost element, and repairs were made as needed—but they were relatively small in magnitude.

A cost accounting system had to be developed to meet the company's financial reporting needs. In 1934, the Securities and Exchange Commission (SEC) began requiring annual reports that were presented in conformity with generally accepted accounting principles. The amount of cost of goods sold was needed for the income statement; the inventory cost—direct materials and supplies, work in process, and finished goods—was needed for the balance sheet. Nobody seemed to question whether the cost accounting system developed to meet these external needs was equally capable of meeting the company's internal needs.

Changing Business

Businesses began to change. After World War II, automation increased its presence on the factory floor. Direct labor became a smaller proportion of total cost—sometimes falling below 10 percent. New manufacturing equipment utilized computer technology, and this technology was changing very rapidly. Replacements frequently were needed. While some machinery needed direct labor involvement, other machinery could be operated without any workers present. Companies were reducing variable direct labor costs only to find that they now had increasing fixed overhead costs. More sophisticated machinery meant higher levels of technical assistance and maintenance were needed.

New products came on the market. Instead of high-volume products with little differentiation among them, great varieties of products, many with short life cycles, were manufactured in small batches. The number of setups rose; the amount of downtime increased. Large amounts of inventories were maintained. Research and development, product design, and marketing activities were of paramount importance. New philosophies were developed to meet these changing needs.

Total Quality Management

Total quality management (TQM) is a philosophy whose objective is to improve performance continuously at all levels, thereby resulting in greater productivity, lower costs, and higher profits. To be successful, everyone in the organization, including top management, must be involved. The objective is to produce quality products and services that absolutely delight, not simply

satisfy, the customer. Production specialists and engineers are not the only people participating in implementing this technique; self-managed teams, consisting of people from all functional areas, are involved and have the power to make needed changes.

Much time and effort is required to make TQM work. The gains that may be attained are impressive, but TQM is not suitable for every organization. Problems concerning the approach to take, training, data collection, and employee compensation may block the chances for ultimate success.

Just-in-Time

Just-in-time (JIT) systems, first begun in Japan, found their way onto the American factory floor. Companies with high-speed, repetitive manufacturing processes benefit the most from JIT; companies producing only unique orders on request benefit the least from JIT. JIT is concerned with eliminating waste and adding value in the production process; efficiency is increased and costs are reduced. Impediments such as capacity bottlenecks, long lead times, machine breakdowns, and poor-quality products are eliminated. Production times are significantly shortened. JIT attempts to avoid manufacturing products before they are needed; consequently, inventory levels—both work in process and finished goods—are vastly reduced, as are storage costs. Producing poor-quality products that must be reworked or scrapped is considered to be waste. Production methods must be upgraded continuously to increase the value of the output by such procedures as quality control training, scheduled maintenance, and improved plant layouts.

Quality is in the eyes of the customers. The customers should be more than simply satisfied with the product. Who is the customer? It is everyone along the processing chain—from one work center to the next, from production to marketing, to the final consumer.

With JIT, relationships with suppliers become critical; the two companies must work together in a spirit of cooperation rather than competition so that high-quality parts can be delivered when needed for production. The frequency of delivery is based on the value and number of the parts. Long-term relationships of mutual benefit are an essential ingredient of the JIT philosophy.

A *kanban* (card) system may be used to control the flow of materials so production proceeds smoothly. The card gives information pertaining to the part number, quantity needed, and delivery place and time. The necessary quantities of parts must be delivered on time throughout the production process. Some companies combine JIT with computer-integrated manufacturing (CIM) to minimize lead times and provide timely and accurate information.

A manufacturing operation usually does not occur unless the resulting part is needed by the next work center in the production line. This is called a pull system of production. Capacity limits of certain processes and production specifications may result, however, in some work being completed and stored until needed.

Machine setup time under JIT must be reduced enough so that processing can be shifted quickly among the different units being produced.

The aggregate setup cost for switching from one product to another is offset by lower financing costs for inventories, reduced downtime, and increased flexibility.

Quality is monitored on an ongoing basis. This process significantly reduces the cost of producing high-quality products by eliminating problems caused by defects. Good equipment, sufficient capacity to be able to handle unexpected increases in demand, and a commitment to maintaining the equipment in top condition are necessary for the JIT system to operate effectively.

Problems with Standard Cost and Variance Systems

Dhavale (1996) notes specific problems that make standard cost and variance systems unsuitable for cellular manufacturing environments (manufacturing products or parts grouped according to similar machine requirements) and focused factories (organizing around a specific set of resources to manufacture a narrow range of products at low cost and high throughput).

- *Continuous improvement.* Standard times become invalid quickly in a continuous improvement program in which processes are continually improved to obtain better quality and efficiency.
- *Learning curve disturbances.* Discontinuous learning curves due to constant improvements result in an absence of stable time standards.
- *Lack of timely information.* The periodic reporting of variances from standard costs does not allow for corrective action to take place as a batch is being produced.
- *Too much aggregation of data.* Variances are usually computed for the total of all batches completed during a period of time rather than on the basis of individual batches.
- *Built-in inefficiencies.* Standards include costs for defective units, scrap, learning time, unavoidable delays, and setup times; however, with the continuous improvement concept, the allowance for defective units, etc., is zero.
- *Adherence to budgets.* Emphasizing adherence to budgets based on standard costs results in such dysfunctional behavior as continuing production to absorb manufacturing overhead, misclassifying direct labor as indirect labor to avoid labor-related variances, and purchasing more materials than needed to take advantage of volume discounts.
- *Direct labor emphasis.* Manufacturing overhead does not vary according to direct labor; therefore, overhead spending variances cannot be explained by changes in direct labor usage.

THE FAILURE OF TRADITIONAL COST SYSTEMS

Product costs are crucial to the profit-making ability of a company. The cost of a product is vital information for setting selling prices and for determining

the marketing effort required. Knowing a product's cost is also important for deciding whether or not to meet or beat a reduction in prices by competitors. Evaluating product profitability is not a difficult task if only one or a very few products are produced. If product variety is abundant, however, the task becomes far more difficult. Manufacturing products requiring special specifications may result in sales to certain customers, but the costs of these products must be determined accurately so that profitability can be ascertained. Landing orders that actually produce losses does not augment the company's overall well-being.

Incorrect cost information can cause a number of problems. Five of these problems, discussed by Peter Turney (1991), are as follows:

1. Product designs that unnecessarily raise costs or miss opportunities to reduce part counts or use common parts—for example, a universal three-hole circuit could replace the one-hole and two-hole circuits in a manufacturing process, but the cost system says the three-hole circuit requires more direct labor than the other two and is therefore more expensive.
2. Acquiring the wrong type of equipment, thereby designing processes in ways that reduce flexibility and quality and raise costs—for example, two or three small, mobile machines is better than one large, stationary machine in terms of scheduling, inventory levels, quality of products, materials handling effort, maintenance, and supervision.
3. Centralizing functions to reduce cost but instead reduce service and quality—for example, centralizing lending operations in the main office rather than at numerous branch offices increases communication costs.
4. Cutting costs across the board but finding that the quality of products and services declines and, as new people are hired, costs proceed to increase again.
5. Moving production to foreign countries but finding that costs increase instead of decrease and quality goes down—for example, the price required by an outside supplier includes transportation costs, but there are still additional costs for longer lead time and incorrect forecasting as compared to a JIT system in conjunction with local suppliers of materials, higher procurement and expediting costs, increased storage costs, and lower levels of quality requiring varying levels of rework.

Variable Costing

To determine whether products are profitable, accountants often use a variable costing system. Variable costs typically include direct materials, direct labor, and variable overhead. When a product's selling price exceeds its variable costs, a contribution to fixed costs is made and the product should be manufactured. But fixed costs are becoming an even larger proportion of total manufacturing costs, with labor among them. Computer-integrated manufacturing requires a sizable investment in software, another fixed cost.

In addition, products are not all produced and marketed in similar ways; some use far more production or marketing resources than others.

Unlike variable costing, the traditional cost accounting system is a full cost (absorption cost) system. Both variable and fixed costs are allocated to production on the basis of direct labor hours (see Exhibit 1-2 for an example of the difference between variable costing and full costing). But with increasing automation in the factory, little direct labor is used in actually producing the product. Most labor is used in engineering, designing, systems analyzing, programming, supervisory, and support activities and is involved with several products at one time rather than with just a single item. The cost of software for computer-integrated manufacturing cannot be allocated reasonably on the basis of production or direct labor hours.

Allocating Overhead

The traditional cost system assigns overhead costs to cost centers and then reallocates them to individual products. Usually, the basis for the secondary allocation is direct labor hours.

Determining a Product's Cost

Assume that two departments have the information presented in part A of Exhibit 1-3. The overhead rate is \$10 per direct labor hour. Each direct labor hour costs \$8. The company decides to use computer-integrated manufacturing in Department R. Overhead costs increase \$15,000 to become \$55,000; direct labor hours are reduced by 2,000 to become 2,000, a savings of \$16,000. With total overhead cost of \$115,000 and total direct labor hours of 8,000, the overhead rate increases to \$14.375 per direct labor hour.

Three of the company's products are BB, CC, and DD. Product BB is produced entirely in Department R; product CC formerly was produced using 1,000 labor hours of Department R and 3,500 labor hours of Department S, but now it is produced using 500 labor hours of Department R and 3,500 labor hours of Department S; and product DD is produced entirely in Department S. The labor hours and applied overhead for these products are shown in part B of Exhibit 1-3.

Product BB's overhead cost is reduced by \$8,437.50 in addition to a decrease of \$12,000 in direct labor cost (1,500 hours multiplied by \$8 per hour). Product BB is produced entirely in Department R, which has reduced its costs by \$1,000 (overhead cost increase of \$15,000 and labor cost decrease of \$16,000). Yet product BB's total cost is decreased by \$20,437.50.

Product CC's overhead cost increases by \$12,500 while labor cost decreases by \$4,000. Although only 500 of the 4,000 labor hours are in Department R, its cost increases by \$8,500. Product DD's overhead cost increases by \$10,937.50. But product DD is not manufactured in Department R at all. Why did its cost increase?

How can management know what each product actually costs under such an accounting system? How can the profitability of each product be determined?

E**Exhibit 1–2****Variable versus Full Costing***Selected Data*

Sales: 800 units × \$57 per unit = \$45,600

Direct materials used: 1,000 units × 5 pounds per unit × \$2 per pound = \$10,000

Direct labor: 1,000 units × 2 hours per unit × \$7 per hour = \$14,000

Variable manufacturing overhead: 1,000 units × 2 hours per unit × \$6 per hour = \$12,000

Fixed manufacturing overhead: allocate on the basis of \$4 per direct labor hour: 1,000 units × 2 hours per unit × \$4 per hour = \$8,000

Variable selling expenses: 800 units × \$1 per unit = \$800

Fixed selling and administrative expenses: \$6,500

Ending inventories: 200 units

Beginning inventories: none

Income Statement—Variable Costing

Sales		\$45,600
Variable manufacturing costs (direct materials, direct labor, variable overhead)	\$36,000	
Ending inventories (20% of units produced)	(7,200)	
Variable cost of sales	28,800	
Variable selling expenses	800	
Total variable expenses		(29,600)
Contribution margin		16,000
Fixed expenses (manufacturing, selling, and administrative)		(14,500)
Income		<u>\$ 1,500</u>

Income Statement—Full Costing

Sales		\$45,600
Total manufacturing costs (variable and fixed)	\$44,000	
Ending inventories	(8,800)	
Cost of goods sold		(35,200)
Gross profit		10,400
Selling and administrative expenses (variable and fixed)		(7,300)
Income		<u>\$ 3,100</u>

Accounting for a Product Moving Through Production Stages

The traditional cost system not only assigns overhead costs on the basis of a small component of total cost—direct labor—but also batches all costs together as the product being manufactured moves from one processing department to the next. Exhibit 1-4 illustrates the cost accounting for a product moving through three stages of production. Overhead costs are allocated on the basis of direct labor hours. Materials cost in stage 3 includes the total

**Exhibit 1-3****Reallocation of Overhead Costs****PART A***Before Change*

	<u>Department R</u>	<u>Department S</u>	<u>Total</u>
Overhead costs	\$40,000	\$60,000	\$100,000
Direct labor hours	4,000	6,000	10,000

Overhead rate is \$10 per direct labor hour.
Direct labor cost is \$8 per hour.

After Change

	<u>Department R</u>	<u>Department S</u>	<u>Total</u>
Overhead costs	\$55,000	\$60,000	\$115,000
Direct labor hours	2,000	6,000	8,000

Overhead rate is $\$115,000/8,000 = \14.375 per direct labor hour.

PART B

<u>Product</u>	<u>Before Change</u>		<u>After Change</u>	
	<u>Labor Hours</u>	<u>Applied Overhead</u>	<u>Labor Hours</u>	<u>Applied Overhead</u>
BB	3,000	\$30,000	1,500	\$21,562.50
CC	4,500	45,000	4,000	57,500.00
DD	2,500	25,000	2,500	35,937.50

PART C

<u>Product</u>	<u>Increase (Decrease) in Labor Cost</u>	<u>Increase (Decrease) in Overhead Cost</u>	<u>Increase (Decrease) in Total Cost</u>
BB	(\$12,000)	(\$8,437.50)	(\$20,437.50)
CC	(4,000)	12,500.00	8,500.00
DD	0	10,937.50	10,937.50

costs in the first two stages. Although the final cost of the product includes all costs of manufacturing (materials, labor, and overhead) and the final cost of all the products adds up to the total costs of manufacturing, the information

**Exhibit 1-4****Costing a Product Through Stages of Production****STAGE 1**

Materials cost	\$ 1.160
Direct labor, 6 minutes at \$8.75/hour	0.875
Manufacturing overhead, \$47.15 per direct labor hour	4.715
Total cost	<u>\$ 6.750</u>

STAGE 2

Cost transferred from stage 1	\$ 6.750
Materials cost	0.240
Direct labor, 10 minutes at \$9.20/hour	1.533
Manufacturing overhead, \$49.62 per direct labor hour	8.270
Total cost	<u>\$16.793</u>

STAGE 3

Cost transferred from stage 2	\$16.793
Direct labor, 2 minutes at \$7.70/hour	0.257
Manufacturing overhead, \$38.93 per direct labor hour	1.298
Total cost	<u>\$18.348</u>

TOTAL MANUFACTURING COSTS

Materials cost	\$ 1.400
Direct labor	2.665
Manufacturing overhead	14.283
Total cost	<u>\$18.348</u>

is of no value to managers who want to know the cost of each individual product, the effect on the costs of individual products from discontinuing one or more products, the profitability of accepting a special order on a particular product, and so on. It is difficult enough to separate materials and labor costs as the product progresses through its three stages. It is even harder to figure which costs for a particular product are fixed and which are variable. The cost system is adequate for financial reporting purposes but is useless for managerial decision making.

What would happen to the cost of the product depicted in Exhibit 1-4 if direct labor hours were reduced by even a small amount? Assume that direct labor hours in stages 1 and 2 are each reduced by one-half minute. The results are shown in Exhibit 1-5. Direct labor cost decreased by only about 15 cents, from \$2.665 to \$2.516. But manufacturing overhead dropped by over five times the decrease in direct labor cost, from \$14.283 to \$13.476. A small decrease in direct labor hours resulted in a 96-cent decline in total cost. Therefore, managers are very interested in saving labor time due to its impact on product costs.

**Exhibit 1–5****Costing a Product—Decrease in Labor Hours****STAGE 1**

Materials cost	\$ 1.160
Direct labor, 5.5 minutes at \$8.75/hour	0.802
Manufacturing overhead, \$47.15 per direct labor hour	4.322
Total cost	<u>\$ 6.284</u>

STAGE 2

Cost transferred from stage 1	\$ 6.284
Materials cost	0.240
Direct labor, 9.5 minutes at \$9.20/hour	1.457
Manufacturing overhead, \$49.62 per direct labor hour	7.856
Total cost	<u>\$15.837</u>

STAGE 3

Cost transferred from stage 2	\$15.837
Direct labor, 2 minutes at \$7.70/hour	.257
Manufacturing overhead, \$38.93 per direct labor hour	1.298
Total cost	<u>\$17.392</u>

TOTAL MANUFACTURING COSTS

Materials cost	\$ 1.400
Direct labor	2.516
Manufacturing overhead	13.476
Total cost	<u>\$17.392</u>

The overhead costs were allocated to products on the basis of direct labor hours. A small drop in these hours results in a large decrease in overhead costs. What happens if some overhead costs can be reduced? The impact is not as great on any single product, because overhead costs are allocated over all of the company's products. Consequently, managers are more concerned with labor time than with overhead costs.

If a company tries to substitute high technology for direct labor, the problem becomes worse. Greater overhead costs are allocated to a smaller number of direct labor hours. Having parts subcontracted in order to substitute cheaper external (maybe foreign) labor for more expensive internal labor does not help either. Overhead costs continue to rise as direct labor hours fall.

Misleading Costs

Products with larger amounts of direct labor bear the most overhead costs, while products using lower amounts of direct labor bear lower overhead costs. The latter products may be more expensive to produce, but the cost

accounting system says they are not. Low-volume, special-order, customized products requiring more engineering change orders, more inspection for quality control, more machine scheduling, more machine setups, more scheduling of materials receipts, more computer programming, more marketing effort, and more design features but relatively little direct labor hours are allocated small amounts of overhead. These products appear to be more profitable than high-volume, standardized products that require more direct labor hours. In addition, these products often require more customer service to solve engineering problems. The costs for this customer service are buried in the overhead costs—or maybe they are assigned to marketing and not included in overhead at all.

In the same manner, some customers may appear to be more or less profitable than they really are. Those customers buying low-volume, customized products may require so much extra support that they are not as profitable as customers who buy high-volume, standardized products frequently.

Variance Anomaly

A change from the assumed product mix can produce a variable overhead budget variance even if the direct labor hours used are equal to the standard number allowed for each product. Assume that a company allows for a standard of 1,500 direct labor hours during a period. The company produces three products: A, B, and C. The standard direct labor hours used for each product are as follows:

Product A	2 direct labor hours per unit
Product B	1/10 direct labor hour per unit
Product C	4/5 direct labor hour per unit

The company expects that 70 percent of production will be for product A, 20 percent for product B, and 10 percent for product C. Variable overhead is budgeted at \$20 per direct labor hour. For a total of 1,500 direct labor hours, variable overhead is computed to be \$30,000. Product A is the most labor intensive; product B is the least labor intensive. Product B requires more indirect labor and support for materials handling, setup, and quality control. The company's production for the period can be summarized as follows:

<u>Product</u>	<u>Units Produced</u>	<u>Standard Direct Labor Hours</u>	<u>Variable Overhead Applied</u>
A	600	1,200	\$24,000
B	600	60	1,200
C	300	240	4,800
		<u>1,500</u>	<u>\$30,000</u>

The direct labor hours used equals the standard direct labor hours for the units produced—there is no labor efficiency variance. The variable overhead applied for 1,500 standard direct labor hours (which equals the 1,500 actual direct labor hours) is the budgeted \$30,000. But actual overhead turns

out to be higher than the budgeted and applied amount. The reason for the discrepancy is the change in the product mix. Product B, which was supposed to be 20 percent of total production, is 40 percent of total production. The higher actual overhead costs associated with product B are not specifically accounted for with the traditional cost accounting system when applying an overhead rate based only on direct labor hours.

Not only is there an unexplained variable overhead spending variance, but the cost of product A appears to be significantly higher than the cost of product B. Because direct labor hours are used as the sole basis for allocating overhead, product A appears to be more costly and therefore less profitable than product B, even though product B actually requires far more overhead costs than are reported by the company's cost accounting system.

Precision and Accuracy

Accounting information is often provided with seemingly great precision. The examples above have shown that there is a big difference between precision and accuracy. Product costs computed with the use of a faulty accounting system are inaccurate and can lead to poor decision making. The higher the overhead costs due to technological advances implemented by a company and the more diversity in products, the greater the distortion in product costs using the traditional accounting system.

Information Provided

Variances are sometimes difficult to interpret. A favorable purchase price variance is welcomed by the purchasing department. If the cost savings are achieved at the expense of quality, however, unfavorable variances may appear for labor and overhead. Similarly, the production department may achieve a favorable efficiency variance and a favorable volume variance, but the cost may be that significantly more inventory than needed has been produced and is now in the warehouse. Storage and handling costs increase. In addition, the desire for increased production to attain favorable variances may come at the expense of quality. Detected errors require rework; undetected errors result in dissatisfied customers.

H. Thomas Johnson and Robert Kaplan (1987) believe that cost accounting systems are influenced too much by financial reporting requirements. Accounting for managerial purposes is different than accounting for external users. The information received by managers is too late, too aggregated, and too distorted to be relevant for planning and control decisions. These failings of cost accounting reports have three important consequences:

1. *Lack of relevant, timely information.* Reported variances have little impact on real production problems and require managers to waste time trying to explain them.
2. *Inaccurate product costs.* Simplistic allocations of overhead result in distortions of the costs of individual products with consequent poor decisions

regarding product pricing, product mix, and responses to competitors' actions.

3. *Pressure to meet short-term goals.* Long-term investments for new products, new processes, equipment maintenance, employee training, improved marketing, and research are curtailed.

Managers have responded to this vacuum by developing their own control systems, whether by using handwritten notes or personal computers. These systems provide timely data on several key variables. If accountants refuse to provide these data as a consequence of being too tied to generally accepted accounting principles, then new information specialists will do the job.

Information needs to be provided on activities (for example, setting up machines and inspecting parts) rather than just by some category (for example, salaries). Information that is too aggregated provides little insight into the real costs of manufacturing and selling a product.

Just-in-time systems applied to production are designed to reduce the time spent on and the cost of nonvalue-added processes such as inspection, long lead times, storage, material movement, and setup time. Manufacturing cells are created for the production of a product or similar products or major components from beginning to end. The objective is to reduce the total cost of producing a product rather than attaining individual performance standards. Allocations are significantly reduced as costs that were previously classified as indirect now become direct to these manufacturing cells—for example, plant supervision and repairs and maintenance. Robert McIlhattan (1987) states that direct labor efficiency and productivity and machine utilization are inappropriate to the JIT philosophy because

- they promote the production of work in process and finished goods inventories beyond the immediate need
- they are more concerned with output than with quality
- they emphasize control of direct labor rather than more significant components of manufacturing cost, and
- they emphasize high utilization of equipment with little time allowed for preventive maintenance.

Variations under JIT should be minimal. Materials rate variations should not occur because of long-term price agreements with the organization's suppliers. During production, personnel should detect immediately any excess materials being used and take corrective action; consequently, materials quantity variations should be almost nonexistent. With direct labor making up such a small component of manufacturing costs, labor and overhead are combined to obtain conversion costs. With quality and efficiency being monitored continuously during production, rather than waiting for the subsequent computation of variations, deviations from standard for conversion costs should be corrected on the spot.

Traditional cost systems provide only manufacturing information pertaining to product cost. But the cost of an item includes more than that. Marketing costs, engineering costs incurred to assure the product operates well, and warranty costs are not accounted for as part of the cost of a product.

Why do many companies continue to use standard cost systems? Dhavale (1996) offers the following explanations:

- If standard costs are used for inventory valuation purposes, the computation of variances is relatively easy and inexpensive.
- Standard costs and variances may be the only performance measures that can be computed for all products and departments throughout the organization.
- Standard costs and variances are an integral part of many accounting software packages.

These possible reasons do not override his belief that standard cost analysis is not appropriate in today's manufacturing environment and an alternative needs to be implemented.

Your Turn: When a Cost Accounting System Is Obsolete

If a company's cost accounting system gives incorrect information on product costs or misleading information on variances (rate, efficiency, spending, or volume), then it may be time to replace the current system with a new one. Robin Cooper (1989) lists 11 factors that may indicate that the time has come to redesign a company's cost system.

In the blank line to the right of each factor, indicate with a check mark which, if any, of these applies to your company.

1. Functional managers want to drop seemingly profitable items. Production managers believe a product is too troublesome to manufacture even though it is profitable or marketing managers believe the product is not priced competitively. _____
2. Profit margins are hard to explain. The production manager cannot explain a product's high cost or the marketing manager does not know why a product that seemingly is not special has such a high profit margin. _____
3. Hard-to-make products show big profits. A product that is difficult to manufacture and requires more inspection and rework than other products does not have higher than average costs and lower than average profit margins. _____
4. Departments have their own cost systems. Functional managers have lost confidence in the company's accounting system because well-designed products are accounted for as unprofitable and poorly designed products are accounted for as profitable. _____
5. The accounting department spends a lot of time on special projects. Lengthy special studies are routinely made because the cost accounting system does not provide managers with the information they need. _____

6. A company has a high-margin niche all to itself. A company has a market for a product all to itself where no barriers to entry by competitors exist. _____
7. Competitors' prices are unrealistically low. Other successful companies charge low prices for products that a company produces in high volume. _____
8. Customers don't mind price increases. Customers continue to buy a product in about the same volume even though the price is raised substantially. _____
9. The results of bids are hard to explain. A company trying to bid high on business it really does not want and low on business that it really does want finds that it keeps winning high bids and losing low bids. _____
10. Vendor bids are lower than expected. The bid prices of competitors vary widely from a company's cost of producing the product. _____
11. Reported costs change because of new financial accounting regulations. New accounting regulations affect product costs even though materials prices and manufacturing costs are constant. _____

If any or all of these factors exist, then a new cost accounting system is needed. Such a system is activity-based costing.



The business environment today is more competitive than ever. Constant improvements, including improvements to the accounting information system, need to be made. The accounting system is a key element in strategic planning and the management control process.

Traditional cost accounting systems allocate overhead costs primarily on the basis of direct labor hours. But as direct labor becomes a smaller component of the manufacturing process and as product diversity increases, overhead allocated on this basis becomes increasingly inaccurate and irrelevant. Worse, products that actually are profitable are identified as being unprofitable, while products that actually are unprofitable are identified as being profitable. This situation results in cross-subsidization of products. Those products that are allocated too much overhead and consequently are priced too high face competition from companies that charge lower prices; those products that are costed too low because not enough overhead was allocated to them have little or no competition. The result is that unprofitable products are produced and sold while potentially successful products garner a decreasing share of the market. This situation could lead to incorrect product discontinuance decisions that could leave the company with producing and selling very few products (a condition referred to as the death spiral). Companies are concerned more with reducing the apparent cause of overhead allocation (usually direct labor hours) than with eliminating nonvalue-added activities (waste).



Review Questions

INSTRUCTIONS: Here is the first set of review questions in this course. Answering the questions following each chapter will give you a chance to check your comprehension of the concepts as they are presented and will reinforce your understanding of them.

As you can see below, the answer to each numbered question is printed to the side of the question. Before beginning, you should conceal the answers in some way, either by folding the page vertically or by placing a sheet of paper over the answers. Then read and answer each question. Compare your answers with those given. For any questions you answer incorrectly, make an effort to understand why the answer given is the correct one. You may find it helpful to turn back to the appropriate section of the chapter and review the material of which you were unsure. At any rate, be sure you understand all the review questions before going on to the next chapter.

1. The purpose of an accounting system is to 1. (a)
 - (a) help a company achieve its goals.
 - (b) establish the objectives of an organization.
 - (c) collect financial data.
 - (d) determine the needs of an organization.

2. The traditional cost accounting system was developed when 2. (d)
 - (a) all overhead costs were variable.
 - (b) overhead costs exceeded direct labor costs.
 - (c) materials and labor were considered to be fixed costs.
 - (d) overhead costs were minor in amount.

3. Which of the following is *true*? 3. (b)
 - (a) When automation came, direct labor became a larger proportion of manufacturing cost.
 - (b) The wide variety of new products results in a larger number of setups.
 - (c) More sophisticated machinery requires less technical assistance.
 - (d) JIT is not concerned with eliminating waste.

4. When overhead is allocated on the basis of direct labor hours, products with _____ amounts of direct labor bear _____ overhead costs. 4. (b)
 - (a) small; no
 - (b) large; more
 - (c) large; lower
 - (d) small; more

5. Increased automation resulted in
- (a) more direct labor.
 - (b) increasing variable costs.
 - (c) less direct labor.
 - (d) less sophisticated machinery.

5. (c)

