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PRINCIPLES OF COST ACCOUNTING

EDWARD J. VANDERBECK • MARIA R. MITCHELL



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Seventeenth Edition

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PREFACE

Why Study Cost Accounting?

The 17th edition of *Principles of Cost Accounting* applies cost concepts, cost behavior, and cost accounting techniques to manufacturing, merchandising, and service businesses. Students learn how to determine costs of products and services more accurately; use the knowledge of product and service costs to set selling prices, to bid on contracts, and to analyze the relative profitability of various products and services; use techniques to measure the performance of managers and subunits within an organization; design an accounting system to fit the production and distribution system of an organization; and use the accounting system as a tool to motivate managers toward the organization's goals.

What Does the 17th Edition Offer?

- Appropriate content for a one-quarter or one-semester cost accounting course.
- A ten-chapter format—a distinguishing feature of the text that makes it most appropriate for shorter courses while still thoroughly covering the topics students need today.
- Directed assignments at intervals within each chapter.
- A very readable and relevant text that covers the essentials of cost accounting in a logical sequence and concise manner.
- Integration of activity-based costing and just-in-time manufacturing coverage has been added throughout the text to ensure that students are familiar with the most recent costing technologies and methods.
- The inclusion of cost accounting techniques for service businesses.
- A discussion of the special purpose reports and analytical techniques used for management decision making.
- Emphasis on nonfinancial performance measures via the balanced scorecard.
- A discussion of quality costs and the preparation of a cost of quality report.

What Is New in the 17th Edition?

The 17th edition includes the following changes:

- All new Business Currents examples that call out the practical applications of cost accounting in the real world.
- The Recall and Review exercises are now matched with similar end-of-chapter exercises.
- The addition of critical thinking components to certain end-of-chapter exercises and problems.
- The use of icons next to certain exercises and problems that relate back to the appropriate Recall and Review exercises and Self-Study problems.
- The inclusion of an integrated example of a skateboard manufacturer that continues throughout the first three job-order costing chapters.
- New coverage on enterprise resource planning systems has been added.
- Increased coverage of activity-based costing.

What Are the Features of the 17th Edition?

The 17th edition includes several features that facilitate the learning process for the student and allow the instructor to teach with ease.

Practical Applications

A Business Currents feature calls out the practical applications of cost accounting in the real world. This feature illustrates how cost accounting concepts from the chapter are practiced in business today.

CengageNOW

Online homework is now a possibility with CengageNOW. CengageNOW is a powerful course management and online homework tool that provides robust instructor control and customization to optimize the student learning experience and meet desired outcomes. CengageNOW offers auto-graded homework and test bank, easy-to-use assignment options, and "Smart Entry" to eliminate common data entry errors. Additional algorithmic problems have been authored to give more flexibility in assigning homework.

Directed Assignments

At specific points within each chapter, students are directed to appropriate end-of-chapter assignments. This allows students to work practice items without completing the entire chapter. Each of these points includes a Recall and Review Exercise with its solution at the end of the chapter. These exercises are referenced to similar end-of-chapter exercises.

Self-Study Problems

Two demonstration problems are included at the end of each chapter, with a step-by-step explanation of how to solve them. These Self-Study Problems are constructed from difficult concepts in the chapter and reinforce the techniques and procedures discussed in the chapter. An added feature is end-of-chapter problems that reference students back to Self-Study Problems that are similar in topic and difficulty.

End-of-Chapter Materials

The end-of-chapter questions, exercises, problems, and mini-cases have been carefully written, revised, added to, and verified to reflect the coverage as it appears in the chapters. There has been a concerted effort to provide the instructor with a wide choice of subject matter, degree of difficulty, and critical thinking opportunities when assigning end-of-chapter materials. Where appropriate, comprehensive review problems have been added that cover concepts from more than one chapter. Additionally, selected problems may be solved using spreadsheet software.

Integrated Learning Objectives

Learning objectives begin each chapter. Each learning objective is indicated in the text where first discussed. All end-of-chapter exercises, problems, and mini-cases are identified by learning objectives.

Key Terms

Key terms are highlighted as they are introduced. They are listed, along with page references, at the end of each chapter. A comprehensive glossary is included at the end of the book providing definitions for all the key terms.

Appendices

The Institute of Management Accountants "Statement of Ethical Professional Practice" is included in an appendix at the end of Chapter 1. An appendix at the end of Chapter 8 illustrates the four-variance and three-variance methods of analyzing factory overhead.

What Supplementary Materials Are Available?

A complete package of supplementary materials is available with the 17th edition of *Principles of Cost Accounting* to assist both instructors and students. The package includes materials that have been carefully prepared and reviewed.

Available to Instructors

All instructor resources are available online on the Instructor Companion Website at http://login.cengage.com.

Solutions Manual. The Solutions Manual contains the answers to all end-of-chapter questions, exercises, problems, and mini-cases. The solutions are author-written and have been verified multiple times for numerical accuracy and consistency.

Test Bank. The test bank helps instructors efficiently assess their students' understanding with problems and questions that reflect the material presented. The Test Bank offers a variety of question types and has also been tagged to distinguish difficulty level, learning objective, and AACSB and IMA standards. Test bank files in Word format, along with versions to import into your LMS, are available on the Instructor Companion Website. Cognero Test Banks are available via Single Sign-on account at http://login.cengage.com.

Cengage Learning Testing Powered By Cognero. Cengage's new test generator software, Cognero, allows authoring, editing, and managing of test bank content from anywhere with internet access. It also allows for creation of multiple test versions in an instant, or for delivery of tests from your Learning Management System.

PowerPoint Presentations. Each presentation enhances lectures and clarifies difficult concepts with concise slides designed to capture and keep your students' attention. These chapter-by-chapter slides are ideal as guides for student note-taking and study.

Instructor Spreadsheet Templates. Increase student awareness and familiarity with basic software applications by utilizing the spreadsheet templates. These templates accompany many end-of-chapter items to assist students in completing the problem. The Instructor Spreadsheet Templates show the completed spreadsheet solutions in an easy-to-use format. Selected problems that have an accompanying template are designated with a spreadsheet icon.

Instructor Companion Website. Access your needed supplements immediately with the companion website. This text-specific website organizes resources by chapter and all instructor materials are password protected. Access the site by going to http://login.cengage.com to create an account or sign-in to your current account.

Available to Students

All student resources are available online on the Student Companion Website. To access the text companion website, simply go to www.cengage brain.com, search for the text ISBN or author's last name and click on the "Access Now" icon under Study Tools. Resources are organized at both the chapter and book level.

Student Spreadsheet Templates. Familiarize yourself with current spreadsheet software while completing your homework assignments easily with these Student Spreadsheet Templates. These templates accompany many end-of-chapter items to assist students in completing the problem.

Selected problems that have an accompanying template are designated with a spreadsheet icon.

Experience Accounting Videos. Highlight progressive companies and allow you to effectively visualize critical chapter concepts—enhancing what you learn in class! The Experience Accounting Videos are available within the Study Tools and Personalized Study Plan in CengageNOW. They can also be bundled at *no additional cost with new copies of the text* or purchased separately. You can access the videos at www.cengage.com/accounting/eav.

Key Term Testing. Test your knowledge of the key terms that are outlined in the text through our online flashcards and crossword puzzles.

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CHAPTER 1

INTRODUCTION TO COST ACCOUNTING

Learning OBJECTIVES

After studying this chapter, you should be able to:

- **LO1** Explain the uses of cost accounting information.
- **LO2** Describe the ethical responsibilities and certification requirements for management accountants, as well as corporate governance.
- **LO3** Describe the relationship of cost accounting to financial and management accounting.
- **LO4** Identify the three basic elements of manufacturing costs.
- **LO5** Illustrate basic cost accounting procedures.
- **LO6** Distinguish between the two basic types of cost accounting systems.
- **LO7** Illustrate a job order cost system.

BUSINESS CURRENTS 1.1

Cost Accounting in Hollywood

As Hollywood film budgets continue to grow, an article in *Bloomberg Businessweek* reported that Universal Studio's *Despicable Me 2* grossed more than $840 million globally, but cost only $76 million, making it one of the most profitable movies in the studio's history. The film's producer, Chris Meledandri, who also produced *Dr. Seuss' The Lorax*, is credited with successfully managing the film's budget. Meanwhile, Jeffrey Katzenberg, CEO of Dreamworks Animation SKG, announced plans to decrease the budgets of the company's animated films by $30 million each, to an average cost of $120 million.

This article raises several questions that may be answered using information introduced in this book:

- Which cost accounting system is best suited for accounting for the costs of producing a film?
- How does one determine which studio costs are included in making a movie?
- What measures may be undertaken by other studios to successfully reduce their budgets?

Source: Palmeri, Christopher, "Despicably Profitable," *Bloomberg Businessweek*, September 23, 2013, Issue 4347, p. 21–22.

The importance of cost accounting information to the successful operation of a business has long been recognized. However, in the current global economic environment, such information is more crucial than ever. Automobiles from South Korea, compact fluorescent light bulbs from China, electronic equipment from Japan, and aircraft from Europe are just a few examples of foreign-made products that have provided stiff competition to U.S. manufacturers both at home and abroad. As a result of these pressures, companies today are placing more emphasis on controlling costs in an attempt to keep their products competitive. For example, U.S. companies are outsourcing production and service activities to other countries, such as production operations in Honduras and Vietnam, and technical support call centers in the Philippines. However, as Business Currents 1.2 indicates, some "offshore" manufacturing is headed back to the United States.

BUSINESS CURRENTS 1.2

"Reshoring" a Continuing Trend

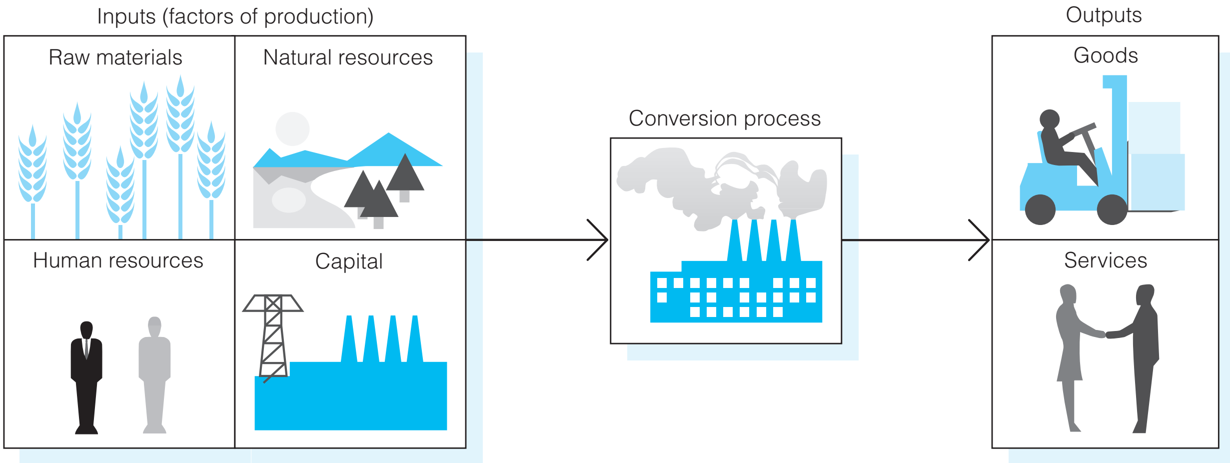
Recently, Wal-mart announced plans to relocate $50 billion in manufacturing to the United States and General Electric has begun manufacturing in Louisville, Kentucky a hybrid water heater that was previously outsourced to a Chinese company. These are just a few examples of the "reshoring" or "onshoring" efforts undertaken by an increasing number of American businesses. Reasons cited for this shift include:

- Pay rates in China have increased at least 15% annually for the past few years. In addition, there has been recent labor unrest in China.
- Oil prices have increased and become more uncertain, resulting in higher shipping costs and energy costs in China, but domestic energy prices are relatively less expensive;
- Companies want more control or protection for their intellectual property;
- Productivity has increased in the United States due to automation;
- Because the customer base is located in the United States, there is a desire to be closer to the customer;
- A declining dollar results in less advantageous exchange rates for imports.

Sources: Kilzer, Lou, "Top U.S. Manufacturers Returning Jobs Back to States from China," *McClatchy-Tribune Business News*, published by The Pittsburgh Tribune-Review, January 5, 2014.
Nash-Hoff, Michele, "How San Diego Reflects National Manufacturing Trends," *Industry Week*, January 24, 2014.
Northam, Jackie, "As Overseas Costs Rise, More U.S. Companies Are 'Reshoring,'" *www.npr.org*, January 22, 2014.

Cost accounting provides the detailed cost information that management needs to control current operations and plan for the future. Figure 1-1 illustrates the production process for goods and services for which cost

Figure 1-1 Production Process for Goods and Services



accounting provides information. Management uses this information to decide how to allocate resources to the most efficient and profitable areas of the business.

All types of business entities—manufacturing, merchandising, and service businesses—require cost accounting information systems to track their activities. **Manufacturers** convert purchased raw materials into finished goods by using labor, technology, and facilities. **Merchandisers** purchase finished goods for resale. They may be **retailers**, who sell products to individuals for consumption, or **wholesalers**, who purchase goods from manufacturers and sell to retailers. **For-profit service businesses**, such as health clubs, accounting firms, and NFL football teams, sell services rather than products. **Not-for-profit service agencies**, such as charities, governmental agencies, and some health care facilities, provide services at little or no cost to the user.

It is necessary for any organization to have a set of procedures in place to provide the financial information needed by that organization. The **accounting information systems** of manufacturers must be designed to accumulate detailed cost data relating to the production process. **Cost accounting systems** are accounting information systems used by manufacturers to track the costs incurred to produce and sell their diverse product lines. While the cost accounting principles and procedures discussed in the text mostly emphasize manufacturers, many of the same principles apply to merchandising and service businesses. Cost accounting is essential to the efficient operation of fast-food restaurants, athletic teams, fine arts groups, hospitals, colleges, social welfare agencies, and numerous other entities. Chapter 9 and other sections throughout the text illustrate cost accounting systems for service businesses.

In many ways, the activities of a manufacturer are similar to those of a merchandiser. They purchase, store, and sell goods; both must have efficient management and adequate sources of capital; and they may employ hundreds or thousands of workers. The manufacturing process itself highlights the differences between the two: merchandisers, such as **Target**, buy goods in marketable form to resell to their customers; manufacturers, such as **Kellogg's**, produce the goods that they sell. Once a merchandiser has acquired goods, it can perform the marketing function. The purchase of raw materials by a manufacturer, however, is only the beginning of a long and sometimes complex chain of events that results in a finished product for sale.

The **manufacturing process** requires the conversion of raw materials into finished goods through the use of labor and other factory resources. A manufacturer must make a major investment in physical assets, such as property, plant, and equipment. To produce finished goods, a manufacturer must purchase appropriate quantities of raw materials and supplies, and develop a workforce. In addition to the cost of materials and labor, the manufacturer incurs other expenses in the production process. Many of these costs, such as depreciation, taxes, insurance, and utilities, are similar to those incurred by a merchandising concern. Costs such as machine maintenance and repair, materials handling, production setup, production scheduling, and inspection are unique to manufacturers. Other costs, such as selling and administrative expenses, are similar to those incurred by merchandisers and service businesses. The methods of accounting for sales, cost of goods sold, and selling and administrative expenses for a manufacturer are similar to those of merchandisers. Service businesses, by comparison, have no inventories because the service is consumed at the time it is provided. The opportunity to sell an empty seat on a flight, for example, is lost once the flight takes off. Service businesses have revenue and operating expenses, but no cost of goods sold.

Note that product quality is as important a competitive weapon as cost control in the global arena. Originally issued for companies marketing products in Europe, but now widely accepted globally, the **ISO 9000** family of standards for quality management was designed by the International Organization for Standardization, based in Switzerland. The standards are based on eight quality management principles, including focus on customer needs, employee involvement and supplier relationships, management and integration of processes and continuous improvement.[1] Major U.S. companies such as **Boeing** require suppliers to have such quality management systems in place.[2]

The **ISO 14000** family of standards addresses various aspects of environmental management. The premise of these standards is that activities that benefit the environment, such as becoming more energy efficient and consuming fewer resources, and reducing waste through recycling and other initiatives, may have substantial economic benefits as well.[3] It is becoming common for companies to implement **sustainability programs** designed to

1 International Organization for Standardization, "Quality Management Principles," www.iso.org.

2 Boeing, "Doing Business with Boeing Mc-Donnell Douglas Aerospace & Defense Systems Terms and Conditions Guide," www.boeingsuppliers.com.

3 International Organization for Standardization, "Environmental Management. The ISO 14000 Family of International Standards," www.iso.org.

reduce the impact of their operations on the environment and to produce reports or devote areas on their websites to report on their progress. A sustainability report may contain details about the company's sustainability goals, how far the company has come in meeting its goals, and the dollar amount of cost savings resulting from its sustainability programs. **Ford** reported in a recent sustainability report that not only does it expect its preferred suppliers' facilities to attain ISO 14000 certification, but 100% have done so.[4]

The cost of environmental damage can be very high. It has been estimated that the lost economic output resulting from the January 2014 chemical spill in the Elk River in West Virginia was $61 million or about 24% of the economic activity of the affected region. This does not include the cost of cleaning up the spill or funds spent for emergency services.[5] In addition, any parties deemed responsible for the spill will likely face fines, damages, and legal costs.

1.1 *Uses of Cost Accounting Information*

LO1 Explain the uses of cost accounting information.

Principles of cost accounting have been developed to enable manufacturers to process the many different costs associated with manufacturing and to provide built-in control features. The information produced by a cost accounting system provides a basis for determining product costs and selling prices, and it helps management plan and control operations.

1.1a Determining Product Costs and Pricing

Cost accounting procedures provide the means to determine product costs that enable the preparation of meaningful financial statements and other reports needed to manage a business. The cost accounting information system must be designed to permit the determination of total product costs and the costs associated with producing one unit, or **unit costs**. For example, the fact that a manufacturer spent $100,000 for labor in a certain month is not, in itself, meaningful; but if this labor produced 5,000 finished units, the fact that the cost of labor was $20 per unit is significant. This figure can be compared to the company's unit labor cost for prior periods and, often, to the labor cost of major competitors.

Unit cost information is also useful in making important marketing decisions such as:

1. *Determining the selling price of a product*. Knowing the manufacturing cost of a product aids in determining the desired selling price. It should be high enough to cover the cost of producing the item and the marketing

4 http://corporate.ford.com/microsites/sustainability-report-2012-13/supply-environmental-supplier

5 "Elk River Spill Cost Economy $19 Million Per Business Day, Study Finds," www.wowktv.com, February 4, 2014.

and administrative expenses attributable to it, as well as to provide a satisfactory profit to the owners.

2. *Meeting competition*. If a product is being undersold by a competitor, detailed information regarding unit costs can be used to determine whether the problem can be resolved by reducing the selling price, by reducing manufacturing and selling expenses attributable to the product, or by some combination of the above that will still result in profitable sales.
3. *Bidding on contracts*. Many manufacturers must submit competitive bids to be awarded contracts. Knowledge of the unit costs attributable to a particular product is of great importance in determining the bid price.
4. *Analyzing profitability*. Unit cost information enables management to determine the amount of profit that each product earns, thereby allocating the company's scarce resources to those that are most profitable. It is not uncommon, however, for some companies to retain a certain product line, known as a **loss leader**, which yields a very low profit, or even a loss, to maintain the product variety that will attract those customers who also purchase the more profitable items. Business Currents 1.3 discusses how Amazon has adopted this strategy.

BUSINESS CURRENTS 1.3

Kindle Profitability

In the January 2012 issue of *PC Magazine*, Angela Moscaritolo reported in an article titled "Kindle Fire Could Be More Profitable than Expected" that Amazon makes up the estimated $18 it loses on each Kindle it sells in less than five months, primarily through sales of eBooks and Kindle apps. It is also expected that Kindle sales would result in additional revenues from the sale of other goods and preferred memberships that allow free shipping.

1.1b Planning and Control

One of the most important aspects of cost accounting is the preparation of reports that management can use to plan and control operations.

Planning is the process of establishing objectives or goals for the firm and determining the means by which they will be met. Effective planning is facilitated by the following:

1. Clearly Defined Objectives. The objectives of the manufacturing operation may be expressed in terms of the number of units to be produced, the desired quality, the estimated unit cost, the delivery schedules, and the desired inventory levels.

2. A Production Plan. This should be a detailed plan designed to guide the company to reach its objectives that includes a description of the manufacturing operations to be performed, a projection of human resource needs for the period, and the coordination of the timely acquisition of materials and facilities.

Cost accounting information enhances the planning process by providing historical costs that serve as a basis for future projections. Management can analyze the data to estimate future costs and operating results and to make decisions regarding the acquisition of additional facilities, any changes in marketing strategies, and the availability of capital.

The word "control" is used in many ways, but from the viewpoint of the manufacturing concern, **control** is the process of monitoring the company's operations and determining whether the objectives identified in the planning process are being accomplished. Effective control is achieved as follows:

1. Assigning Responsibility. Responsibility should be assigned for each detail of the production plan. All managers should know precisely what their responsibilities are in terms of efficiency, operations, production, and costs. The key to proper control involves the use of responsibility accounting and cost centers.

The essence of **responsibility accounting** is the assignment of accountability for costs or production results to those individuals who have the most authority to influence them. It requires a cost information system that traces the data to cost centers and their managers.

A **cost center** is a unit of activity within the factory to which costs may be practically and equitably assigned. A cost center may be a department or a group of workers; it could represent one job, one process, or one machine. The criteria for a cost center are (1) a reasonable basis on which manufacturing costs can be traced or allocated and (2) a person who has control over and is accountable for many of the costs charged to that center.

With responsibility accounting, the manager of a cost center is accountable only for those costs that the manager controls. For example, labor and material costs will be charged to the cost center, but the manager may be responsible only for the quantity of materials used and the number of labor hours worked. This manager would probably not be accountable for the unit cost of raw materials or the hourly rate paid to employees. These decisions are normally beyond the manager's control and are the responsibility of the purchasing and human resource departments, respectively. The manager may be responsible for the cost of machinery maintenance and repair due to misuse in the cost center, but not responsible for the costs of depreciation, taxes, and insurance on the machinery if the decision to purchase the machinery was made at a higher level in the organization. If production in the cost center for a given period is lower than planned, this could be due to poor supervision of production workers, which is the manager's responsibility. If the decrease in production is caused by less-skilled workers being hired by Human Resources, however, that would be beyond the manager's control.

Cost of production summaries for a cost center reflect its costs, in dollars, and its production activity, in units. In a responsibility accounting system, the specific data for which the manager is responsible would be highlighted for the purpose of performance evaluation. Quite often, both a cost of production summary and a separate performance report will be prepared for a cost center. The **performance report** will include only those costs and production data that the center's manager can control. An illustration of a performance report appears in Figure 1-2. Note the "variance columns" that appear in the illustration. A **variance** represents the amount by which the actual result differs from the budgeted or planned amount. If the actual amount spent is less than the amount budgeted, the variance is *favorable (F);* if more than budgeted, it is *unfavorable (U)*. An in-depth discussion of budgeting and variance analysis appears in Chapters 7 and 8.

These reports must be furnished at regular intervals (monthly, weekly, or daily) on a timely basis. To provide the maximum benefit, the reports should be available as soon as possible after the end of the period being reported. Reports not produced in a timely fashion are not effective in controlling future operations.

2. Periodically Measuring and Comparing Results. Actual operating results should be reviewed periodically and compared to the objectives established in the planning process. This analysis, which may be made monthly, weekly, daily, or even hourly in the case of production and scrap reports, is a major part of cost control because it compares current performance with the overall plan. The actual dollars, units produced, hours worked, or materials used are compared with the **budget**, which is management's operating plan expressed in quantitative terms (units and dollars). This comparison is a primary feature of cost analysis. The number of dollars spent or the quantity of units produced has little significance until compared with the budgeted amounts. Note that the appropriateness of the $157,600 actual year-to-date expenditure for "Food" in Figure 1-2 can be evaluated only when compared to the budgeted amount of $155,300.

3. Taking Necessary Corrective Action. The performance reports may identify problem areas and deviations from the business plan. Appropriate corrective action should be implemented where necessary. A significant variance from the plan is a signal for attention. An investigation may reveal a weakness to be corrected or a strength to be better utilized. Management wants to know not only the results of operations but also how the results—whether favorable or unfavorable—compare with the plan, why things happened, and who was responsible. For example, management may want to determine the causes of the unfavorable year-to-date variance of $2,300 for "Food" in Figure 1-2. The variance may be due to an uncontrollable rise in food prices or to a controllable waste of food at the restaurant, or a combination of both. Based on the variance analysis, management must be prepared to improve existing conditions by such means as implementing more economical purchasing methods and standardizing portion sizes. Otherwise, the periodic measurement of activity has little value. The relationship of planning and control is illustrated in Figure 1-3.

Figure 1-2 Performance Report

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1						Barbara's Bistro								
2						Performance Report - Kitchen								
3						September 30, 2016								
4				***Budgeted***				***Actual***				***Variance***		
5	***Expense***		***September***		***Year-to-***		***September***		***Year-to-***		***September***		***Year-to-***	
6					**Date**				**Date**				**Date**	
7	Kitchen wages		$5,500		$47,000		$5,200		$46,100		$300	F	$900	F
8	Food		17,700		155,300		18,300		157,600		600	U	2,300	U
9	Supplies		3,300		27,900		3,700		29,100		400	U	1,200	U
10	Utilities		1,850		15,350		1,730		16,200		120	F	850	U
11	Total		$28,350		$245,550		$28,930		$249,000		$580	U	$3,450	U
12														

F = Favorable; U = Unfavorable