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FIFTH EDITION

COST MANAGEMENT



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FIFTH EDITION

Cost Management

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*This book is dedicated to our students—past, present, and future—
who are at the heart of our passion for teaching.*

Brief Contents

| | |
|-------------------|--|
| CHAPTER 1 | Introduction to Cost Management 2 |
| CHAPTER 2 | Basic Cost Management Concepts 28 |
| CHAPTER 3 | Cost Behavior and Forecasting 78 |
| CHAPTER 4 | Activity-Based Costing 144 MAKING THE CONNECTION 210 |
| CHAPTER 5 | Product and Service Costing: Job-Order System 216 |
| CHAPTER 6 | Process Costing 262 |
| CHAPTER 7 | Allocating Costs of Support Departments and Joint Products 316 |
| CHAPTER 8 | Budgeting for Planning and Control 372 |
| CHAPTER 9 | Standard Costing: A Functional-Based Control Approach 440 |
| CHAPTER 10 | Decentralization: Responsibility Accounting, Performance Evaluation, and Transfer Pricing 498 MAKING THE CONNECTION 546 |
| CHAPTER 11 | Strategic Cost Management 552 |
| CHAPTER 12 | Activity-Based Management 626 |
| CHAPTER 13 | Strategic-Based Control Systems and the Balanced Scorecard 672 |
| CHAPTER 14 | Quality and Environmental Cost Management 706 |
| CHAPTER 15 | Lean Accounting and Productivity Measurement 766 MAKING THE CONNECTION 806 |
| CHAPTER 16 | Cost-Volume-Profit Analysis 812 |
| CHAPTER 17 | Activity Resource Usage Model and Tactical Decision Making 866 |
| CHAPTER 18 | Pricing and Profitability Analysis 912 |
| CHAPTER 19 | Capital Investment 972 |
| CHAPTER 20 | Inventory Management: Economic Order Quantity, JIT, and the Theory of Constraints 1018 |
| CHAPTER 21 | International Issues in Cost Management 1058 MAKING THE CONNECTION 1090 |

Glossary 1094

Check Figures 1106

Subject Index 1111

Company Index 1124

Examples 1126

Dear Colleague,

As experienced cost management instructors who are “in the teaching trenches”—both face-to-face and online—we have created (over the years and with this revision of the fifth edition) *the book that we would want to (and do) use to best excite, motivate, educate, and prepare* our accounting students for success in the real world! Offering cutting edge and up-to-date coverage has always been one of the distinguishing features of our text. Students *should be exposed* to ongoing developments in the real world of cost management. Furthermore, they should have the opportunity to see how real-world organizations use both the traditional and the innovative data analytic models that are so prevalent in cost management.

We are confident that the fifth edition continues to build on the cutting-edge reputation that *Cost Management* has developed. We continue to offer coverage of such innovative topics as time-driven activity-based costing (TDABC), Duration-Based Costing (DBC), the Balanced Scorecard, lean accounting, and the theory of constraints. Moreover, there are a number of new features in the fifth edition that add to the overall value proposition of the text. We are absolutely sure that both instructors and students will be excited, motivated, educated, and better prepared by the following new features:

1. *A new exciting opening chapter feature* that applies one or more of the chapter’s main cost management topics to various real companies. For example, the book kicks off the first three chapters by focusing on Kroger, Amazon, and Airbnb—all of which are large, highly recognizable, and relatable companies (which includes service companies in the “gig” economy that students find so interesting). Additional chapter openers feature such companies as Marvel Studios, University of Pittsburgh Medical Center, Wells Fargo, Big Pharma, Cardinal Health, SpaceX, and Delta Air Lines. We chose these particular companies to motivate students—they **know of, relate to,** and perhaps even **shop at** these inherently interesting companies, all of which motivates students to study the chapter’s particular cost management topics.
2. *A new data analytics framework* is introduced in Chapter 2 and applied in every chapter using four end-of-chapter exercises and text examples as appropriate. The value of our approach is that an instructor can choose to cover the role of data analytics within *Cost Management* heavily, lightly, or even not at all. This approach gives instructors maximum flexibility to apply effective data analytics coverage in whatever way best fits their particular comfort and desire. The book’s new data analytics icon makes it easy to identify the data analytic content throughout the book.
3. *Updated real-world application examples within the text* relate each chapter’s given topics to highly recognizable companies, such as Boeing, Royal Dutch Shell, Walmart, Pfizer, and the Mayo Clinic, thereby continuing the real-world applicability introduced by the opening chapter feature company.
4. *New chapter on the role that cost management plays in various and timely international business decisions* A full chapter on international business helps students see how global involvement requires additional approaches to cost accounting knowledge. Ways of involving the business in international trade, including importing and exporting, joint ventures, and wholly owned subsidiaries are discussed. The impact of foreign currency translation on profitability is addressed along with the new cryptocurrencies such as Bitcoin and Ethereum. A section on ethics in international business helps students understand the complexity of doing business in different cultures.
5. *New forensic accounting applications* are added for particular cost management issues. As the field of forensic accounting continues to grow in various capacities, the book highlights where appropriate (in Chapters 1, 3, 17, and 18) the role that forensic accounting plays in important cost management decisions, such as cost behavior assessments, loss valuation forecasts, differential analysis in lost profit estimations, and predatory pricing considerations.

6. *Updated and expanded coverage of TDABC and DBC* has been added. In particular, the relationship between TDABC and DBC is presented, and additional end-of-chapter exercises for the topics are provided. DBC is also integrated into the lean accounting framework with appropriate end-of-chapter exercises.

Our goal is both to provide up-to-date coverage of current and developing cost management topics and analytical models and to provide students with insights concerning their real-world use. We understand that cost management is learned by doing—by the practice and use of the various models and concepts. Therefore, we have developed a set of rich and challenging exercises and problems.

In conclusion, we would like to reiterate the overall value proposition that we confidently offer:

We affirm that our cost management text will excite, motivate, educate, and prepare accounting students for success in the real world.

Sincerely,

Don Hansen, Maryanne Mowen, Dan Heitger

Tools for Progressively Learning, Understanding, and Applying Cost Concepts

- **Brief Exercises** (formerly Cornerstone Exercises) are structured like the “Examples” (formerly “Cornerstone Examples”) in the text. They provide students with precise guidance and detailed practice before moving on to the more complex questions. The “What If” feature challenges students to think beyond the numbers and understand the concepts behind the equations.
- **Exercises** are longer and more complex versions of the Brief Exercises. They allow students to apply what they’ve learned with the additional support of Show Me How videos in select Exercises.
- **Problems** are designed to cross learning objectives and bring concepts together. They challenge students to apply their knowledge in a variety of real-world scenarios.
- **Making the Connection: Integrative Exercises** are cumulative exercises, covering Chapters 1 to 4, 5 to 10, 11 to 15, and 16 to 21. Now incorporating data analytics, these comprehensive exercises allow students to demonstrate their mastery of learning objectives by bringing together important concepts across multiple chapters.

Additional Resources

Additional instructor and student resources for this product are available online. Instructor assets include a Guide to Teaching Online, Solutions Manual, Educator Guide, PowerPoint® slides, PowerPoint Guide for Instructors, Excel® template solutions, and a test bank powered by Cognito®. Student assets include Excel® template files for completing selected end-of-chapter exercises and problems. Sign up or sign in at www.cengage.com to search for and access this product and its online resources.

Key Changes to This Edition

There is now an Opening Scenario for each chapter that illustrates a real organization using one or more of the chapter's topics. The text introduces a data analytics framework and each chapter provides four end-of-chapter items (exercises and problems) that allow students to test their knowledge and understanding of this new framework. Moreover, the four Integrative Exercises are revised and incorporate one or more requirements that pertain to the new data analytics framework.

There are additional important changes for specific chapters. Selected chapters have updated the existing real-world application examples, continuing the objective of emphasizing the real-world applicability of the chapter's topics that began with the new Opening Scenarios. Additionally, some chapters now have new forensic accounting applications with associated end-of-chapter exercises. Two chapters also have new material on time-driven activity-based costing (TDABC) and Duration-Based Costing (DBC) with additional end-of-chapter exercises.

The growing importance and relevance of international business activities led to the creation of a completely new chapter, International Issues in Cost Management. This chapter covers such critical topics as location in foreign trade zones, currency translation, cryptocurrency, international implications of transfer pricing, and ethics.

The Discussion Questions and Review Problems and Solutions that had been included in the text are now available to instructors in Instructors' Resources and other online resources. This streamlines the text while retaining them online for students.

The changes are detailed in the chapter-by-chapter listing that follows.

Chapter 1: Introduction to Cost Management

1. Added new Opening Scenario featuring the importance of various cost management topics to the effective management of **The Kroger Co.**
2. Expanded the Factors Affecting the Use of Cost Management, including business sustainability, forensic accounting, and an introductory discussion of data analytics.

Chapter 2: Basic Cost Management Concepts

1. Added a new Opening Scenario featuring the importance of cost structure and the accounting information system to decision makers at **Amazon.**
2. Added new section on data analytics, including comprehensive yet practical framework (Exhibits 2.5 and 2.6) for understanding the role of data analytics within cost management and applying this role to improved decision making.
3. Added a new comprehensive Exhibit 2.7 regarding Understanding Difference Cost Definition.

Chapter 3: Cost Behavior and Forecasting

1. Added a new Opening Scenario featuring the importance of using cost behavior and cost terminology, such as discretionary versus nondiscretionary costs, for **Airbnb** hosts to be financially successful.
2. Added a new Real-World Example on business sustainability at **FedEx.**
3. Added a new subsection on the role of cost behavior in forensic accounting, including a new exercise on using cost behavior insights to estimate damages in a lawsuit.
4. Increased the coverage and examples of nonlinear cost behavior.

Chapter 4: Activity-Based Costing

1. Added an Opening Scenario. The scenario shows how the **University of Pittsburgh Medical Center (UPMC)** implements an activity-based costing system to improve its efficiency.
2. Added additional coverage of time equations for TDABC and a section that compares TDABC with DBC.
3. Added new exercises and problems dealing with TDABC and DBC.

Chapter 5: Product and Service Costing: Job-Order System

1. Added Opening Scenario featuring **Marvel Studios'** use of accountants on *Avengers: Endgame*.
2. Added explanation of how data analytics can be used in job-order costing.

Chapter 6: Process Costing

1. Added an Opening Scenario. **LafargeHolcim**, the largest cement producer in the world, is used to illustrate the importance of process costing.

Chapter 7: Allocating Costs of Support Departments and Joint Products

1. Added Opening Scenario featuring the way **IBM, Hewlett-Packard, and Dow Chemical** have converted support departments into shared service centers.
2. Added four exercises and problems that deal with the data analytics framework.

Chapter 8: Budgeting for Planning and Control

1. Added Opening Scenario showing how companies such as **Lufthansa AG**, **Cathay Pacific Airlines**, and **PPG** used budgeting to respond rapidly to the impact of the corona virus pandemic.
2. Added ways in which **Kimberly-Clark** used budgeting techniques to manage production of diapers and toilet paper during the pandemic lockdown.
3. Added how **Marriott** and **Delta Air Lines** reduced CEO compensation to conserve cash during budget crunch.

Chapter 9: Standard Costing: A Functional-Based Control Approach

1. Added Opening Scenario spotlighting ways in which hospitals and medical centers use standard costing and variance analysis to give them early warning of potential problems.

Chapter 10: Decentralization: Responsibility Accounting, Performance Evaluation, and Transfer Pricing

1. Added Opening Scenario showing how **Nike Vaporfly** shoes contributed to sales and ROI of the company.

Chapter 11: Strategic Cost Management

1. Added a new section on Enterprise Risk Management and its role in cost management analyses and improved decision making, including new exercises and problems.
2. Added a new Opening Scenario featuring **Cardinal Health's** use of Enterprise Risk Management to help achieve its strategy.

Chapter 12: Activity-Based Management

1. Added an Opening Scenario. **Ipsen Signes**, a French pharmaceutical company, and winner of the Shingo Prize, was used to illustrate the importance of waste reduction through activity management.

Chapter 13: Strategic-Based Control Systems and the Balanced Scorecard

1. Added a new Opening Scenario featuring the failed strategic-based control system at Wells Fargo.
2. Added two new Real-World Examples applying strategic-based control systems and business sustainability at **Royal Dutch Shell**.
3. Added a new Real-World Example that focuses on how companies, such as **Sentio**, use sentiment analysis and other data analytic techniques to glean insights from customer social media data and investor earnings calls.

Chapter 14: Quality and Environmental Cost Management

1. Added an Opening Scenario. The scenario shows how **Baxter International**, a large medical products company, manages product and environmental quality.
2. Updated the winners of the Baldrige Award.
3. Updated the section on ISO 9000 standards.

Chapter 15: Lean Accounting and Productivity Measurement

1. Added an Opening Scenario. The scenario describes how **Nestle Waters UK** used lean manufacturing and lean accounting to reduce costs and become more efficient.
2. Updated the list of Shingo Prize recipients.
3. Updated a Real-World Example box.
4. Revised and expanded the section on value-stream costing. DBC was added as a costing method for the lean accounting setting and associated end-of-chapter exercises and problems were added.

Chapter 16: Cost-Volume-Profit Analysis

1. Added Opening Scenario discussing the meaning of break-even analysis for social media giants such as Instagram, Snapchat, and Twitter.
2. Added the way in which **Mayo Clinic** used cost-volume-profit analysis to see the impact of changing product mix on its overall profit.

Chapter 17: Activity Resource Usage Model and Tactical Decision Making

1. Added new Opening Scenario showcasing the importance of special order decisions at **Delta Air Lines**.
2. Added new Opening Scenario featuring **CVS'** product drop decision to discontinue the sale of all tobacco products.
3. Added comprehensive new product keep or drop or add for restaurant service company.
4. Added new Real-World Example illustrating a special order decision at Pfizer.
5. Added new subsection on the role of differential analysis in forensic accounting, including a new exercise that uses relevant analysis to estimate damages in a lawsuit.
6. Added numerous brief Real-World examples throughout the text regarding the use of relevant analysis in various tactical decisions.

Chapter 18: Pricing and Profitability Analysis

1. Added new Opening Scenario focusing on setting prices in pharmaceutical companies such as **Pfizer**.
2. Added new Real-World Example focusing on the use of data analytics in estimating price elasticity in the medical industry.
3. Added a new sub-section on the role of costs in forensic accounting pricing cases, including a new exercise involving cost plus pricing in forensic accounting environments.
4. Added new problem on loss leader pricing (a variant of cost-based pricing).
5. Added new Ethical real company example regarding EpiPen pricing considerations.

Chapter 19: Capital Investment

1. Added an Opening Scenario. In the scenario, **SpaceX** is used to illustrate the role and importance of capital budgeting.
2. The tax rate used for calculating after-tax cash flows was revised to reflect the new corporate tax rate. Associated examples, exercises, and problems were revised to reflect this new rate.

Chapter 20: Inventory Management: Economic Order Quantity, JIT, and the Theory of Constraints

1. Added an Opening Scenario. The scenario shows how **Dr. Reddy's Laboratories** Limited used the theory of constraints to improve product quality and inventory management.
2. Updated two Real-World Example boxes.

Chapter 21: International Issues in Cost Management

This chapter is new to this edition and includes:

1. Discussion of the role of the accountant in international business.
2. Importing, exporting, joint ventures, and wholly owned subsidiaries.
3. Foreign currency translation, including a discussion of cryptocurrencies.
4. Transfer pricing in the international arena.
5. A discussion of ethics in global business.

Technology



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Additional instructor and student resources for this product are available online. Instructor assets include a Solutions Manual, Solutions to Excel templates Educator's Guide, PowerPoint® slides, Guide to Online Teaching, and a test bank powered by Cognition®. Student assets include Excel templates for selected exercises and problems. Sign up or sign in at www.cengage.com to search for and access this product and its online resources.

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Contents

CHAPTER 1

Introduction to Cost Management 2

Financial Accounting Versus Cost Management: A Systems Framework 4

- Financial Accounting Information System 4
- The Cost Management Information System 4
- Different Systems for Different Purposes 5

Factors Affecting the Use of Cost Management 6

- Global Competition 7
- Growth in the Service Industry 7
- Advances in Digital Information Technology and the Manufacturing Environment 7
- Customer Orientation 9
- Total Quality Management 9
- Data Analytics 10
- Forensic Accounting 11
- Business Sustainability 12

The Role of the Management Accountant 13

- Line and Staff Positions 13
- Exhibit 1.1 Partial Organizational Chart: Manufacturing Company 14
- Information for Planning, Controlling, Continuous Improvement, and Decision Making 14
- Exhibit 1.2 Performance Report Illustrated 15

Accounting and Ethical Conduct 15

- Benefits of Ethical Behavior 16
- Standards of Ethical Conduct for Management Accountants 16
- Exhibit 1.3 Statement of Ethical Professional Practice: Institute of Management Accountants (IMA) 17

Certification 18

- The Certificate in Management Accounting 18
- The Certificate in Public Accounting 18
- The Certificate in Internal Auditing 18

CHAPTER 2

Basic Cost Management Concepts 28

A Systems Framework 30

- Accounting Information Systems 30
- Exhibit 2.1 Operational Model of the Home Theater System 31
- Exhibit 2.2 Operational Model of an Accounting Information System 32
- Exhibit 2.3 The Value Chain 33
- Relationship to Other Operational Systems and Functions 34
- Different Systems for Different Purposes 35

- Exhibit 2.4 Subsystems of the Accounting Information System 36

The Growing Importance of Data Analytics within Cost Management 36

- A Framework for Understanding the Role of Data Analytics in Cost Management 36
- Exhibit 2.5 The Role of Data Analytics in Cost Management 37
- Data Analytic Types and Cost Management Analyses 39
- Exhibit 2.6 Matching Data Analytic Types to Cost Management Analyses 40

Cost Assignment: Direct Tracing, Driver Tracing, and Allocation 40

- Cost Objects 40
- Accuracy of Cost Assignments 41

Product and Service Costs 43

- Different Costs for Different Purposes 44
- Exhibit 2.7 Understanding Different Cost Definitions 45
- Product Costs and External Financial Reporting 46
- Example 2.1** The HOW and WHY of Calculating Prime Cost, Conversion Cost, Variable Product Cost, and Total Product Cost 48

External Financial Statements 49

- Income Statement: Manufacturing Firm 50
- Example 2.2** The HOW and WHY of Preparing the Statement of Cost of Goods Manufactured 50
- Example 2.3** The HOW and WHY of Preparing the Statement of Cost of Goods Sold 52
- Example 2.4** The HOW and WHY of Preparing the Income Statement for a Manufacturing Firm 53
- Income Statement: Service Organization 54

Traditional and Activity-Based Cost Management Systems 54

- Traditional Cost Management Systems: A Brief Overview 55
- Activity-Based Cost Management Systems: A Brief Overview 55
- Exhibit 2.8 Activity-Based Management Model 56
- Choice of a Cost Management System 57
- Exhibit 2.9 Comparison of Traditional and Activity-Based Cost Management Systems 57
- Exhibit 2.10 Trade-Off between Measurement and Error Costs 58
- Exhibit 2.11 Shifting Measurement and Error Costs 59

CHAPTER 3

Cost Behavior and Forecasting 78

Basics of Cost Behavior 80

- Cost Objects 81
- Measures of Output 81
- Fixed Costs 82

| | |
|---|------------|
| Exhibit 3.1 Fixed Cost Behavior | 83 |
| Variable Costs | 83 |
| Cost Behavior and Its Role in Forensic Accounting | 84 |
| Exhibit 3.2 Variable Cost Behavior | 84 |
| Linearity Assumption | 85 |
| Exhibit 3.3 Nonlinearity of Variable Costs | 86 |
| Exhibit 3.4 Relevant Range for Variable Costs | 86 |
| Mixed Costs | 87 |
| Example 3.1 The HOW and WHY of Forming an Equation to Describe Mixed Cost | 87 |
| Exhibit 3.5 Mixed Cost Behavior | 88 |
| Time Horizon | 88 |
| Resources, Activities, and Cost Behavior | 88 |
| Flexible Resources | 89 |
| Committed Resources | 89 |
| Implications for Control and Decision Making | 90 |
| Step-Cost Behavior | 90 |
| Exhibit 3.6 Step-Cost Function | 91 |
| Exhibit 3.7 Step-Fixed Costs | 92 |
| Example 3.2 The HOW and WHY of Calculating Activity Availability, Capacity Used, and Unused Capacity | 92 |
| Activities and Mixed Cost Behavior | 93 |
| Methods of Determining Cost Behavior | 94 |
| Example 3.3 The HOW and WHY of Using Account Analysis to Determine Fixed and Variable Costs | 94 |
| Quantitative Methods for Separating Mixed Costs into Fixed and Variable Components | 96 |
| Example 3.4 The HOW and WHY of Using the High-Low Method to Determine Fixed Cost and Variable Rate | 97 |
| The High-Low Method | 98 |
| Scatterplot Method | 99 |
| Exhibit 3.8 Scattergraph for Anderson Company's Materials Handling Costs | 100 |
| Exhibit 3.9 Scattergraphs for Various Cost Behavior Patterns | 101 |
| The Method of Least Squares | 102 |
| Exhibit 3.10 Deviations of Data from a Line | 102 |
| Using Regression Programs | 103 |
| Exhibit 3.11 Spreadsheet Data for Anderson Company's Materials Handling Cost | 104 |
| Exhibit 3.12 Regression Results for Anderson Company's Materials Handling Cost | 105 |
| Example 3.5 The HOW and WHY of Using the Regression Results for Fixed Cost and Variable Rate to Construct and Use a Cost Formula | 105 |
| Reliability of Cost Formulas | 106 |
| Hypothesis Test of Parameters | 106 |
| Goodness of Fit Measures | 107 |
| Exhibit 3.13 Correlation Illustrated | 108 |
| Standard Errors | 108 |
| Multiple Regression | 109 |
| Exhibit 3.14 Multiple Regression Results for Anderson Company's Materials Handling Cost | 111 |
| Example 3.6 The HOW and WHY of Constructing a Cost Equation Using the Results from Multiple Regression | 111 |
| Nonlinear Cost Behavior and the Learning Curve | 112 |
| Semi-Variable Cost Behavior | 112 |
| Exhibit 3.15 Semi-Variable Cost: Increasing Rate | 113 |
| Exhibit 3.16 Semi-Variable Cost: Decreasing Rate | 114 |
| Cumulative Average-Time Learning Curve | 114 |
| Example 3.7 The HOW and WHY of Calculating the Cumulative Average-Time Learning Curve | 115 |
| Exhibit 3.17 Spreadsheet for Cumulative Average-Time Learning Model | 117 |
| Exhibit 3.18 Graph of Cumulative Total Hours Required and the Cumulative Average Time per Unit | 117 |
| Incremental Unit-Time Learning Curve | 118 |
| Managerial Judgment | 118 |
| CHAPTER 4 | |
| Activity-Based Costing | 144 |
| Unit-Level Product Costing | 147 |
| Exhibit 4.1 Unit-Based Product-Costing Model | 147 |
| Overhead Assignment: Plantwide Rates | 148 |
| Example 4.1 The HOW and WHY of Applied Overhead and Unit Overhead Cost: Plantwide Rates | 148 |
| Calculation and Disposition of Overhead Variances | 149 |
| Overhead Application: Departmental Rates | 150 |
| Example 4.2 The HOW and WHY of Overhead Variances and Their Disposal | 150 |
| Example 4.3 The HOW and WHY of Departmental Overhead Rates: Their Assignment and Rationale | 152 |
| Limitations of Plantwide and Departmental Rates | 153 |
| Non-Unit-Related Overhead Costs | 153 |
| Product Diversity | 154 |
| The Failure of Unit-Based Overhead Rates | 154 |
| Exhibit 4.2 Product-Costing Data | 154 |
| Unit Cost Computation: Plantwide and Departmental Overhead Rates | 155 |
| Exhibit 4.3 Unit Product Cost: Plantwide and Departmental Rates | 155 |
| Example 4.4 The HOW and WHY of Consumption Ratios | 156 |
| Example 4.5 The HOW and WHY of Activity-Based Costing | 157 |
| Exhibit 4.4 Comparison of Unit Costs | 159 |
| Activity-Based Costing System | 160 |
| Activity Identification, Definition, and Classification | 160 |
| Exhibit 4.5 Activity-Based Costing Model | 161 |
| Exhibit 4.6 Design Steps for an ABC System | 161 |
| Exhibit 4.7 Sample Activity Inventory | 162 |
| Assigning Costs to Activities | 163 |
| Exhibit 4.8 Activity Dictionary: Cardiology Unit | 164 |

Example 4.6 The HOW and WHY of Assigning Resource Costs to Activities 165

Exhibit 4.9 Unbundling of General Ledger Costs 167

Cost Objects and Bills of Activities 167

Exhibit 4.10 Bill of Activities: Cardiology Unit 167

Classifying Activities 168

Exhibit 4.11 Assigning Costs: Final Cost Objects 168

Reducing the Size and Complexity of an ABC System 169

Before-the-Fact Simplification: TDABC 169

Example 4.7 The HOW and WHY of TDABC 170

Duration-Based Costing (DBC) 173

Example 4.8 The HOW and WHY of DBC 174

After-the-Fact Simplification 176

Exhibit 4.12 Data for Patterson Company 177

Example 4.9 The HOW and WHY of Approximately Relevant ABC Systems 178**Example 4.10** The HOW and WHY of Equally Accurate Reduced ABC Systems 180**MAKING THE CONNECTION: INTEGRATIVE EXERCISE PART 1 (CHAPTERS 1–4) 210****CHAPTER 5****Product and Service Costing: Job-Order System 216****Characteristics of the Production Process 217**

Manufacturing Firms versus Service Firms 218

Exhibit 5.1 Continuum of Services and Manufactured Products 218

Exhibit 5.2 Features of Service Firms and Their Interface with the Cost Management System 219

Unique versus Standardized Products and Services 221

Setting Up the Cost Accounting System 222

Cost Accumulation 222

Exhibit 5.3 Relationship of Cost Accumulation, Cost Measurement, and Cost Assignment 222

Cost Measurement 223

Cost Assignment 224

Choosing the Activity Level 226

Exhibit 5.4 Measures of Activity Level 226

The Job-Order Costing System: General Description 227

Overview of the Job-Order Costing System 227

Exhibit 5.5 The Job-Order Cost Sheet 228

Materials Requisitions 228

Exhibit 5.6 Materials Requisition Form 229

Job Time Tickets 229

Exhibit 5.7 Time Ticket 229

Overhead Application 230

Unit Cost Calculation 230

Example 5.1 The HOW and WHY of Setting Up a Simplified Job-Order Cost Sheet 230**Job-Order Costing: Specific Cost Flow Description 231**

Accounting for Direct Materials 232

Exhibit 5.8 Summary of Direct Materials Cost Flows 232

Accounting for Direct Labor Cost 233

Accounting for Overhead 233

Exhibit 5.9 Summary of Direct Labor Cost Flows 233

Exhibit 5.10 Summary of Overhead Cost Flows 235

Accounting for Finished Goods Inventory 235

Exhibit 5.11 Completed Job-Order Cost Sheet 236

Exhibit 5.12 Summary of Finished Goods Cost Flow 236

Exhibit 5.13 Statement of Cost of Goods Manufactured 237

Accounting for Cost of Goods Sold 237

Exhibit 5.14 Statement of Cost of Goods Sold 238

Example 5.2 The HOW and WHY of Using a Job-Order Cost Sheet to Determine the Balances of Work in Process, Finished Goods, and Cost of Goods Sold 238

Exhibit 5.15 All Signs Company Summary of Manufacturing Cost Flows 239

Accounting for Nonmanufacturing Costs 240

Data Analytics in Job-Order Costing 240

Exhibit 5.16 Income Statement 241

Job-Order Costing with Activity-Based Costing 241**Example 5.3** The HOW and WHY of Using Activity-Based Costing in Job-Order Costing 242**Accounting for Spoiled Units in a Traditional Job-Order Costing System 243****Example 5.4** The HOW and WHY of Accounting for Normal and Abnormal Spoilage in a Job-Order Environment 243**CHAPTER 6****Process Costing 262****Basic Operational and Cost Concepts 264**

Cost Flows 264

Exhibit 6.1 An Operational Process System: Antihistamine Manufacturing 265

Exhibit 6.2 Comparison of Cost Accumulation Methods 265

Example 6.1 The HOW and WHY of Cost Flows: Process Costing 266

The Production Report 267

Exhibit 6.3 Process Cost Flows Illustrated Using T-Accounts: No Ending WIP 267

Exhibit 6.4 Basic Features of a Process-Costing System 268

Unit Costs 268

Process Costing with No Work-in-Process Inventories 268

Service Organizations 269

Example 6.2 The HOW and WHY of Process Costing: Services with No WIP Inventories 269

JIT Manufacturing Firms 270

The Role of Activity-Based Costing 270

Process Costing with Ending Work-In-Process Inventories 270

- Physical Flow and Equivalent Units 271
- Example 6.3** The HOW and WHY of Physical Flow Analysis and Equivalent Units: EWIP Only 271
- Calculating Unit Costs, Assigning Costs to Inventories, and Reconciliation 273
- Example 6.4** The HOW and WHY of Unit Cost, Inventory Valuation, and Cost Reconciliation: EWIP Only 273
- The Five Steps of the Production Report 274
- Example 6.5** The HOW and WHY of a Production Report 274
- Nonuniform Application of Productive Inputs 275
- Example 6.6** The HOW and WHY of Equivalent Units and Unit Costs with Nonuniform Inputs 275
- Beginning Work-in-Process Inventories 277

FIFO Costing Method 277

- Example 6.7** The HOW and WHY of Physical Flow Analysis and Equivalent Units: FIFO Method 278
- Example 6.8** The HOW and WHY of Unit Cost and Cost Assignment: FIFO 279
- Step 4 of FIFO Revisited 281
- Production Report and Journal Entries 281
- Exhibit 6.5 Production Report: Blending Department 282

Weighted Average Costing Method 282

- Example 6.9** The HOW and WHY of Physical Flow Analysis and Equivalent Units: Weighted Average Method 283
- Example 6.10** The HOW and WHY of Unit Cost and Cost Assignment: Weighted Average Method 284
- Production Report 286
- FIFO Compared with Weighted Average 286
- Exhibit 6.6 Production Report: Blending Department 286

Treatment of Transferred-in Goods 287

- Exhibit 6.7 Production and Cost Data: Encapsulating Department 289
- Exhibit 6.8 Equivalent Units of Production: Weighted Average Method 289

Operation Costing 290

- Exhibit 6.9 Production Report: Encapsulating Department 290
- Basics of Operation Costing 291
- Exhibit 6.10 Basic Features of Operation Costing 292
- Operation Costing Example 293

CHAPTER 7

Allocating Costs of Support Departments and Joint Products 316

An Overview of Cost Allocation 317

- Types of Departments 318
- Exhibit 7.1 Examples of Departmentalization for a Manufacturing Firm and a Service Firm 319
- Exhibit 7.2 Steps in Allocating Support Department Costs to Producing Departments 319

- Exhibit 7.3 Examples of Possible Activity Drivers for Support Departments 320
- Types of Allocation Bases 320
- Objectives of Allocation 320

Allocating One Department's Costs to Other Departments 322

- A Single Charging Rate 322
- Example 7.1** The HOW and WHY of Calculating and Using a Single Charging Rate 323
- Multiple Charging Rates 324
- Example 7.2** The HOW and WHY of Calculating and Using Multiple Charging Rates 325
- Budgeted versus Actual Usage 327
- Exhibit 7.4 Use of Budgeted Data for Product Costing: Comparison of Single- and Dual-Rate Methods 328
- Exhibit 7.5 Use of Actual Data for Performance Evaluation Purposes: Comparison of Single- and Dual-Rate Methods 328
- Fixed versus Variable Bases: A Note of Caution 329

Choosing a Support Department Cost Allocation Method 329

- Exhibit 7.6 Data for Support and Producing Departments 330
- Direct Method of Allocation 330
- Exhibit 7.7 Allocation of Support Department Costs to Producing Departments Using the Direct Method 331
- Example 7.3** The HOW and WHY of Allocating Support Department Costs to Producing Departments Using the Direct Method 331
- Sequential Method of Allocation 332
- Exhibit 7.8 Allocation of Support Department Costs to Producing Departments Using the Sequential Method 333
- Example 7.4** The HOW and WHY of Allocating Support Department Costs to Producing Departments Using the Sequential (Step) Method 334
- Reciprocal Method of Allocation 336
- Total Cost of Support Departments 336
- Example 7.5** The HOW and WHY of Allocating Support Department Costs to Producing Departments Using the Reciprocal Method 336
- Comparison of the Three Methods 338
- Exhibit 7.9 Comparison of Support Department Cost Allocations Using the Direct, Sequential, and Reciprocal Methods 339

Departmental Overhead Rates and Product Costing 339

- Example 7.6** The HOW and WHY of Using Allocated Support Department Costs to Calculate Departmental Overhead Rates 339
- Support Department Cost Allocation Benefits 340

Accounting for Joint Production Processes 341

- Exhibit 7.10 Joint Production Process 342
- Cost Separability and the Need for Allocation 342

Exhibit 7.11 Independent Multiple-Product Production Using the Same Material 342

Accounting for Joint Product Costs 343

Example 7.7 The HOW and WHY of Using the Physical Units Method to Allocate Joint Product Costs 344

Example 7.8 The HOW and WHY of Using the Weighted Average Method to Allocate Joint Product Costs 345

Allocation Based on Relative Market Value 346

Sales-Value-at-Split-Off Method 347

Example 7.9 The HOW and WHY of Using the Sales-Value-at-Split-Off Method to Allocate Joint Product Costs 347

Example 7.10 The HOW and WHY of Using the Net Realizable Value Method to Allocate Joint Product Costs 349

Example 7.11 The HOW and WHY of Using the Constant Gross Margin Percentage Method to Allocate Joint Product Costs 350

Accounting for By-Products 351

Ethical Implications of Cost Allocation 353

CHAPTER 8

Budgeting for Planning and Control 372

The Role of Budgeting in Planning and Control 373

Purposes of Budgeting 374

Exhibit 8.1 The Master Budget and Its Interrelationships 374

The Budgeting Process 375

Exhibit 8.2 Components of the Master Budget 376

Gathering Information for Budgeting 377

Exhibit 8.3 Short-Term Bookings Forecast for Oil Field Equipment Company 378

Preparing the Operating Budget 379

Sales Budget 379

Production Budget 379

Example 8.1 The HOW and WHY of Constructing a Sales Budget 380

Example 8.2 The HOW and WHY of Constructing a Production Budget 381

Direct Materials Purchases Budget 382

Example 8.3 The HOW and WHY of Constructing a Direct Materials Purchases Budget 383

Direct Labor Budget 384

Example 8.4 The HOW and WHY of Constructing a Direct Labor Budget 385

Overhead Budget 386

Ending Finished Goods Inventory Budget 386

Example 8.5 The HOW and WHY of Constructing an Overhead Budget 386

Example 8.6 The HOW and WHY of Preparing the Ending Finished Goods Inventory Budget 387

Cost of Goods Sold Budget 388

Example 8.7 The HOW and WHY of Preparing the Cost of Goods Sold Budget 388

Marketing Expense Budget 389

Example 8.8 The HOW and WHY of Constructing a Marketing Expense Budget 389

Administrative Expense Budget 390

Additional Operating Budgets 390

Example 8.9 The HOW and WHY of Constructing an Administrative Expense Budget 391

Budgeted Income Statement 392

Example 8.10 The HOW and WHY of Constructing a Budgeted Income Statement 392

Operating Budgets for Merchandising and Service Firms 393

Preparing the Financial Budget 394

The Cash Budget 394

Exhibit 8.4 The Cash Budget 395

Example 8.11 The HOW and WHY of Constructing a Cash Receipts Budget with an Accounts Receivable Aging Schedule 395

Example 8.12 The HOW and WHY of Constructing a Cash Budget 397

Budgeted Balance Sheet 399

Exhibit 8.5 Balance Sheet for ABT, Inc. 399

Exhibit 8.6 Budgeted Balance Sheet for ABT, Inc. 400

Shortcomings of the Traditional Master Budget Process 400

Flexible Budgets for Planning and Control 402

Static Budgets versus Flexible Budgets 403

Exhibit 8.7 ABT Performance Report for Quarter 1: Comparison of Actual with Static (Master) Budget Amounts 403

Example 8.13 The HOW and WHY of Constructing a Flexible Budget for Varying Levels of Activity 404

Example 8.14 The HOW and WHY of Constructing a Flexible Budget for the Actual Level of Activity 406

Exhibit 8.8 Managerial Performance Report: Quarterly Production (in thousands) 407

Activity-Based Budgets 408

Exhibit 8.9 Traditional Budget for the Secure-Care Department 409

Exhibit 8.10 Flexible Budget for the Secure-Care Department 410

Exhibit 8.11 Activity-Based Budget for the Secure-Care Department 411

The Behavioral Dimension of Budgeting 412

Characteristics of a Good Budgetary System 412

CHAPTER 9

Standard Costing: A Functional-Based Control Approach 440

Developing Unit Input Standards 442

Establishing Standards 442

Kaizen Standards 443

Usage of Standard Costing Systems 443

Exhibit 9.1 Cost Assignment Approaches 444

Standard Cost Sheets 445
 Exhibit 9.2 Standard Cost Sheet for Deluxe Strawberry Frozen Yogurt 445
Example 9.1 The HOW and WHY of Computing Standard Quantities Allowed (*SQ* and *SH*) 446
Variance Analysis and Accounting: Direct Materials and Direct Labor 447
 Calculating the Direct Materials Price Variance and Direct Materials Usage Variance 447
Example 9.2 The HOW and WHY of Computing the Direct Materials Price Variance (*MPI*) and Direct Materials Usage Variance (*MUV*) 448
 Exhibit 9.3 Standard Bill of Materials 451
 Accounting for Direct Materials Price and Usage Variances 452
Example 9.3 The HOW and WHY of Computing the Direct Labor Rate Variance (*LRI*) and Direct Labor Efficiency Variance (*LEV*) 453
 Investigating Direct Materials and Labor Variances 455
Example 9.4 The HOW and WHY of Using Control Limits to Determine When to Investigate a Variance 456
 Disposition of Direct Materials and Direct Labor Variances 458
Example 9.5 The HOW and WHY of Closing the Balances in the Variance Accounts at the End of the Year 459
Variance Analysis: Overhead Costs 460
 Four-Variance Method for Calculating Overhead Variances 461
Example 9.6 The HOW and WHY of Calculating the Total Variable Overhead Variance 461
 Calculating the Variable Overhead Spending Variance and Variable Overhead Efficiency Variance 462
Example 9.7 The HOW and WHY of Computing the Variable Overhead Spending Variance and the Variable Overhead Efficiency Variance 463
 Interpreting the Variable Overhead Variances 464
 Exhibit 9.4 Variable Overhead Spending Variance by Item 465
 Four-Variance Analysis: The Two Fixed Overhead Variances 466
 Calculating the Fixed Overhead Spending Variance and Fixed Overhead Volume Variance 466
 Exhibit 9.5 Variable Overhead Spending and Efficiency Variances by Item 466
Example 9.8 The HOW and WHY of Computing the Fixed Overhead Spending Variance and the Fixed Overhead Volume Variance 467
 Interpreting the Fixed Overhead Variances 469
 Exhibit 9.6 Fixed Overhead Spending Variance by Item 469
 Accounting for Overhead Variances 470
 Two- and Three-Variance Analysis Methods 471
 Exhibit 9.7 Two-Variance Analysis: Helado Company 471
 Exhibit 9.8 Three-Variance Analysis: Helado Company 472

Mix and Yield Variances: Materials and Labor 472
Example 9.9 The HOW and WHY of Computing the Mix Variance 473
Example 9.10 The HOW and WHY of Computing the Yield Variance 475
 Direct Labor Mix and Yield Variances 476

CHAPTER 10

Decentralization: Responsibility Accounting, Performance Evaluation, and Transfer Pricing 498
Responsibility Accounting 500
 Types of Responsibility Centers 500
 The Role of Information and Accountability 501
Decentralization 501
 Reasons for Decentralization 502
 The Units of Decentralization 504
Measuring the Performance of Investment Centers 505
 Return on Investment 505
Example 10.1 The HOW and WHY of Calculating Average Operating Assets, Margin, Turnover, and Return on Investment (ROI) 506
 Residual Income 510
Example 10.2 The HOW and WHY of Calculating Residual Income 510
 Project I 511
 Project II 511
 Economic Value Added 513
Example 10.3 The HOW and WHY of Calculating the Weighted Average Cost of Capital and EVA 514
 Multiple Measures of Performance 516
Measuring and Rewarding the Performance of Managers 517
 Incentive Pay for Managers—Encouraging Goal Congruence 517
 Managerial Rewards 518
Transfer Pricing 520
 The Impact of Transfer Pricing on Income 520
Setting Transfer Prices 520
 Exhibit 10.1 Impact of Transfer Price on Transferring Divisions and the Company as a Whole 520
 Market Price 521
 Negotiated Transfer Prices 522
 Exhibit 10.2 Summary of Sales and Production Data 523
 Exhibit 10.3 Comparative Income Statements 523
 Exhibit 10.4 Comparative Statements 525
Example 10.4 The HOW and WHY of Calculating Market-Based and Negotiated Transfer Prices 526
 Cost-Based Transfer Prices 527
Example 10.5 The HOW and WHY of Calculating Cost-Based Transfer Prices 528
MAKING THE CONNECTION: INTEGRATIVE EXERCISE PART 2 (CHAPTERS 5–10) 546

CHAPTER 11**Strategic Cost Management 552****Strategic Cost Management: Basic Concepts 554**

- Strategic Positioning: The Key to Creating and Sustaining a Competitive Advantage 555
- Value-Chain Framework, Linkages, and Activities 556
- Exhibit 11.1 Value Chain for the Petroleum Industry 557
- Organizational Activities and Cost Drivers 558
- Exhibit 11.2 Organizational Activities and Drivers 558
- Operational Activities and Drivers 559
- Exhibit 11.3 Operational Activities and Drivers 559
- Exhibit 11.4 Organizational and Operational Activity Relationships 560

Enterprise Risk Management 560

- Determining Risk Appetite 561
- Identifying Top Risks 561
- Exhibit 11.5 Key Steps within the ERM Process 561
- Assessing Inherent Risks 562
- Exhibit 11.6 Key Elements of a Portfolio Risk Management Perspective 563
- Exhibit 11.7 Enterprise Risk Management at Bayer 564
- Responding to Risks 564
- Net Benefit of Risk Response 565
- Example 11.1** The HOW and WHY of Using Net Benefit to Evaluate Risk Response Alternatives 566
- Monitoring the ERM Process 568

Value-Chain Analysis 568

- Exploiting Internal Linkages 569
- Exhibit 11.8 Internal Value Chain 569
- Example 11.2** The HOW and WHY of Exploiting Internal Linkages to Reduce Costs and Increase Value 569
- Exhibit 11.9 Step-Cost Behavior: Purchasing Activity 571
- Exploiting Supplier Linkages 571
- Example 11.3** The HOW and WHY of Activity-Based Supplier Costing 573
- Exploiting Customer Linkages 574
- Example 11.4** The HOW and WHY of Activity-Based Customer Costing 576

Life-Cycle Cost Management 577

- Product Life-Cycle Viewpoints 577
- Exhibit 11.10 Product Sales Revenue Life Cycle: Marketing Viewpoint 578
- Exhibit 11.11 Product Cost Life Cycle: Production Viewpoint 579
- Interactive Viewpoint 579
- Exhibit 11.12 Typical Relationships of Product Life-Cycle Viewpoints 580
- Example 11.5** The How and Why of Activity-Based Life-Cycle Cost Reduction 581
- Role of Target Costing 583

- Exhibit 11.13 Target-Costing Model 584

Just-In-Time (JIT) Manufacturing and Purchasing 585

- Inventory Effects 586
- Plant Layout 587
- Grouping of Employees 587
- Exhibit 11.14 Plant Layout Pattern: Traditional versus JIT 588
- Employee Empowerment 588
- Exhibit 11.5 Comparison of JIT Approaches with Traditional Manufacturing and Purchasing 589
- Total Quality Control 589

JIT and Its Effect on the Cost Management System 589

- Traceability of Overhead Costs 589
- Product Costing 590
- Exhibit 11.16 Product Cost Assignment: Traditional Versus JIT Manufacturing 590
- JIT's Effect on Job-Order and Process-Costing Systems 591
- Backflush Costing 591
- Example 11.6** The HOW and WHY of Backflush Costing 593

CHAPTER 12**Activity-Based Management 626****The Relationship of Activity-Based Costing and Activity-Based Management 628**

- Exhibit 12.1 The Two-Dimensional Activity-Based Management Model 628

Process Value Analysis 629

- Driver Analysis: Defining Root Causes 629
- Activity Analysis: Identifying and Assessing Value Content 630
- Assessing Activity Performance 633

Financial Measures of Activity Efficiency 633

- Reporting Value- and Non-Value-Added Costs 634
- Exhibit 12.2 Formulas for Value- and Non-Value-Added Costs 635

Example 12.1 The HOW and WHY of Value- and Non-Value-Added Cost Reporting 635

- Trend Reporting of Non-Value-Added Costs 636

Example 12.2 The HOW and WHY of Non-Value-Added Cost Trend Reporting 636

- Drivers and Behavioral Effects 637
- The Role of Kaizen Standards 638
- Exhibit 12.3 Kaizen Cost Reduction Process 639

Example 12.3 The HOW and WHY of Kaizen Costing 639

- Benchmarking 640
- Activity Flexible Budgeting 641
- Exhibit 12.4 Flexible Budget: Direct Labor Hours 642

Exhibit 12.5 Activity Flexible Budget 642
 Exhibit 12.6 Activity-Based Performance Report 643
Example 12.4 The HOW and WHY of Activity-Based Flexible Budgeting 643
 Activity Capacity Management 644
Example 12.5 The HOW and WHY of Activity Capacity Management 645
Implementing Activity-Based Management 646
 Discussion of the ABM Implementation Model 647
 Exhibit 12.7 ABM Implementation Model 647
 Why ABM Implementations Fail 648
Financial-Based Versus Activity-Based Responsibility Accounting 649
 Exhibit 12.8 The Responsibility Accounting Model 650
 Assigning Responsibility 650
 Exhibit 12.9 Responsibility Assignments Compared 651
 Establishing Performance Measures 651
 Exhibit 12.10 Performance Measures Compared 652
 Evaluating Performance 652
 Assigning Rewards 652
 Exhibit 12.11 Performance Evaluation Compared 652
 Exhibit 12.12 Rewards Compared 653

CHAPTER 13

Strategic-Based Control Systems and the Balanced Scorecard 672

Strategic-Based Control Systems 674

Exhibit 13.1 The Three Elements of a Strategic-Based Control System 675
 Company Strategy 676
 Performance Measures 676
 Exhibit 13.2 Balancing Performance Measure Characteristics 678
 Incentive Programs 678

Basic Concepts of the Balanced Scorecard 680

Strategy Translation 680
 Exhibit 13.3 Strategy Translation Process 681
 The Financial Perspective, Objectives, and Measures 681
 Exhibit 13.4 Summary of Objectives and Measures: Financial Perspective 682
 Customer Perspective, Objectives, and Measures 682
 Core Objectives and Measures 682
 Customer Value 683
 Exhibit 13.5 Summary of Objectives and Measures: Customer Perspective 683
 Process Perspective, Objectives, and Measures 684
 Innovation Process: Objectives and Measures 684
 Operations Process: Objectives and Measures 684
 Cycle Time and Velocity 684
Example 13.1 The HOW and WHY of Calculating Cycle Time and Velocity 685

Manufacturing Cycle Efficiency (MCE) 686
Example 13.2 The HOW and WHY of Calculating Manufacturing Cycle Efficiency (MCE) 686
 Post-Sales Service Process: Objectives and Measures 687
 Learning and Growth Perspective 687
 Exhibit 13.6 Summary of Objectives and Measures: Process Perspective 687

Linking Measures to Strategy 688

Exhibit 13.7 Summary of Objectives and Measures: Learning and Growth Perspective 689
 The Concept of a Testable Strategy with Strategic Feedback 689

Example 13.3 The HOW and WHY of Strategy Mapping 690

Exhibit 13.8 Strategy Map for Example 13.3 691

Strategic Alignment 692

Communicating the Strategy 692
 Targets and Incentives 692
 Exhibit 13.9 Targets and Weighting Scheme Illustrated 693
 Resource Allocation 694

CHAPTER 14

Quality and Environmental Cost Management 706

Costs of Quality 709

Quality Defined 709
 Costs of Quality Defined 710
 Quality Cost Measurement 711
 Exhibit 14.1 Examples of Quality Costs by Category 711
 Exhibit 14.2 The Taguchi Quality Loss Function 712
 Exhibit 14.3 Quality Loss Computation Illustrated 713

Reporting Quality Costs 713

Example 14.1 The HOW and WHY of Preparing a Quality Cost Report 714
 Optimal Distribution of Quality Costs: Zero-Defects with Robust Quality View 715
 Exhibit 14.4 Quality Cost Categories: Relative Contribution Graphs 715
 Exhibit 14.5 Robust Quality and the Zero-Defects Quality Graph 716
 The Role of Activity-Based Cost Management 717

Quality Cost Information and Decision Making 717

Decision-Making Contexts 718
 Certifying Quality Through ISO 9000 720

Controlling Quality Costs 720

Choosing the Quality Standard 721
 Types of Quality Performance Reports 722
Example 14.2 The HOW and WHY of Preparing Interim Quality Performance Reports 722

| | |
|--|-----|
| Example 14.3 The HOW and WHY of Multiple-Period Quality Trend Reporting | 724 |
| Exhibit 14.6 Multiple-Period Trend Graph: Total Quality Costs | 725 |
| Exhibit 14.7 Multiple-Period Trend Graph: Individual Quality Cost Categories | 726 |
| Exhibit 14.8 Multiple-Period Trend Graph: Relative Quality Costs | 726 |
| Example 14.4 The HOW and WHY of Long-Range Quality Performance Reporting | 727 |
| Defining, Measuring, and Controlling Environmental Costs | 729 |
| The Ecoefficiency Paradigm | 729 |
| Exhibit 14.9 Ecoefficiency Relationships | 730 |
| Environmental Costs Defined | 732 |
| Environmental Cost Report | 732 |
| Exhibit 14.10 Classification of Environmental Costs by Activity Type | 733 |
| Example 14.5 The HOW and WHY of an Environmental Cost Report | 733 |
| Exhibit 14.11 Relative Distribution: Environmental Costs | 734 |
| Environmental Cost Reduction | 735 |
| An Environmental Financial Report | 735 |
| Exhibit 14.12 Environmental Financial Statement | 735 |
| Environmental Costing | 736 |
| Environmental Product Costs | 736 |
| Activity-Based Environmental Cost Assignments | 737 |
| Example 14.6 The HOW and WHY of Activity-Based Environmental Cost Assignments | 737 |

CHAPTER 15

Lean Accounting and Productivity Measurement 766

| | |
|--|-----|
| Lean Manufacturing | 768 |
| Value by Product | 770 |
| Value Stream | 770 |
| Exhibit 15.1 Order Fulfillment Value Stream | 770 |
| Exhibit 15.2 Matrix Approach to Identifying Value Streams | 771 |
| Value Flow | 771 |
| Exhibit 15.3 Garn's Current Departmental Layout: Model A Aluminum Wheel Production | 772 |
| Exhibit 15.4 Garn's Proposed Manufacturing Cell (Model A) | 772 |
| Example 15.1 The HOW and WHY of Cellular Manufacturing | 773 |
| Pull Value | 774 |
| Pursue Perfection | 774 |
| Lean Accounting | 775 |
| Focused Value Streams and Traceability of Overhead Costs | 776 |
| Exhibit 15.5 Value-Stream Costs | 776 |
| Value-Stream Costing | 777 |

| | |
|--|-----|
| Exhibit 15.6 Steel Wheel Value-Stream Costs and Production Hours | 779 |
|--|-----|

Example 15.2 The HOW and WHY of Value-Stream Product Costing 779

| | |
|---|-----|
| Value-Stream Reporting | 780 |
| Exhibit 15.7 Garn Autoparts Profit and Loss Statement Decision Making | 781 |
| Performance Measurement | 781 |
| Exhibit 15.8 ABS Value-Stream Box Scorecard | 782 |

Productive Efficiency 783

| | |
|---|-----|
| Partial Productivity Measurement Defined | 783 |
| Exhibit 15.9 Improving Technical Efficiency | 784 |
| Exhibit 15.10 Improving Allocative Efficiency | 785 |
| Partial Measures and Measuring Changes in Productive Efficiency | 785 |

| | |
|--------------------------------|-----|
| Advantages of Partial Measures | 785 |
|--------------------------------|-----|

| | |
|-----------------------------------|-----|
| Disadvantages of Partial Measures | 786 |
|-----------------------------------|-----|

Total Productivity Measurement 786

| | |
|----------------------------------|-----|
| Profile Productivity Measurement | 786 |
|----------------------------------|-----|

Example 15.3 The HOW and WHY of Profile Productivity Measurement 787

| | |
|--|-----|
| Profit-Linked Productivity Measurement | 788 |
|--|-----|

Example 15.4 The HOW and WHY of Profit-Linked Productivity Measurement 789

MAKING THE CONNECTION: INTEGRATIVE EXERCISE PART 3 (CHAPTERS 11–15) 806

CHAPTER 16

Cost-Volume-Profit Analysis 812

The Break-Even Point and Target Profit in Units and Sales Revenue 815

| | |
|---------------------------------|-----|
| Basic Concepts for CVP Analysis | 816 |
|---------------------------------|-----|

Example 16.1 The HOW and WHY of Basic Cost Calculations and the Contribution-Margin-Based Income Statement 816

| | |
|--|-----|
| The Equation Method for Break-Even and Target Income | 818 |
|--|-----|

Example 16.2 The HOW and WHY of Calculating the Units Needed to Break Even and to Achieve a Target Profit 819

| | |
|------------------------------|-----|
| Contribution Margin Approach | 820 |
|------------------------------|-----|

| | |
|---|-----|
| Exhibit 16.1 Division of Revenue into Variable Cost and Contribution Margin | 821 |
|---|-----|

Example 16.3 The HOW and WHY of Calculating Revenue for Break-Even and for a Target Profit 822

| | |
|----------------------------------|-----|
| Comparison of the Two Approaches | 823 |
|----------------------------------|-----|

After-Tax Profit Targets 824

Example 16.4 The HOW and WHY of Calculating the Number of Units to Generate an After-Tax Target Profit 824

Multiple-Product Analysis 826

| | |
|--|-----|
| Break-Even Point in Units for the Multiple-Product Setting | 826 |
|--|-----|

Example 16.5 The HOW and WHY of Calculating the Break-Even Number of Units in a Multiproduct Firm 828
 Sales-Revenue Approach 830

Graphical Representation of CVP Relationships 831
 The Profit-Volume Graph 831
 Exhibit 16.2 Profit-Volume Graph 832
 The Cost-Volume-Profit Graph 832
 Exhibit 16.3 Cost-Volume-Profit Graph 833
 Assumptions of Cost-Volume-Profit Analysis 833
 Exhibit 16.4 Cost and Revenue Relationships 834

Changes in the CVP Variables 835
 Exhibit 16.5 Summary of the Effects of Alternative 1 836
 Exhibit 16.6 Summary of the Effects of Alternative 2 836
 Introducing Risk and Uncertainty 836
 Exhibit 16.7 Summary of the Effects of Alternative 3 837

Example 16.6 The HOW and WHY of Calculating Margin of Safety 837

Example 16.7 The HOW and WHY of Calculating Degree of Operating Leverage and Percent Change in Profit 839
 Sensitivity Analysis and CVP 840
 Exhibit 16.8 Differences Between Manual and Automated Systems 840

CVP Analysis and Non-Unit Cost Drivers 842
 Example Comparing Conventional and ABC Analysis 842
 Strategic Implications: Conventional CVP Analysis Versus ABC Analysis 843
 CVP Analysis and JIT 844
 CVP Analysis, Multiple Drivers, and Nonprofit Entities 845
 Exhibit 16.9 Summary of Important Equations 846

CHAPTER 17

Activity Resource Usage Model and Tactical Decision Making 866

Tactical Decision Making 868
 The Tactical Decision-Making Process 869
 Qualitative Factors 870
 Exhibit 17.1 Decision Model: Tactical Decision-Making Process 871

Relevant Costs and Revenues 872
 Relevant Costs Illustrated 872
 Irrelevant Cost Illustrated 873

Relevancy, Cost Behavior, and the Activity Resource Usage Model 874
 Flexible Resources 874
 Committed Resources 874
 Exhibit 17.2 Resource Demand and Supply 876

Illustrative Examples of Tactical Decision Making 876
 Make-or-Buy Decisions 876
Example 17.1 The HOW and WHY of Structuring a Make-or-Buy Decision 877
 Exhibit 17.3 Activity and Cost Information 879
 Keep-or-Drop Decisions 881

Example 17.2 The HOW and WHY of Structuring a Keep-or-Drop Product Line Decision 882
 Special-Order Decisions 885

Example 17.3 The HOW and WHY of Structuring a Special-Order Decision 886
 Decisions to Sell or Process Further 887

Example 17.4 The HOW and WHY of Structuring a Sell at Split-Off or Process Further Decision 888
 The Role of Differential Analysis in Forensic Accounting 889
 Relevant Costing and Ethical Behavior 891
 Relevant Cost Analysis in Personal Decision Making 891

CHAPTER 18

Pricing and Profitability Analysis 912

Basic Pricing Concepts 914
 Demand and Supply 914
 Price Elasticity of Demand 915
 Market Structure and Price 916
 Exhibit 18.1 Characteristics of the Four Basic Types of Market Structure 917

Cost and Pricing Policies 917
 Cost-Based Pricing 917
Example 18.1 The HOW and WHY of Calculating a Markup on Cost 918
 Target Costing and Pricing 919
 Other Pricing Policies 921

The Legal System and Pricing 922
 Predatory Pricing 922
 Price Discrimination 923
Example 18.2 The HOW and WHY of Calculating Cost and Profit by Customer Class 924
 The Role of Costs in Forensic Accounting Pricing Cases 926

Measuring Profit 927
 Reasons for Measuring Profit 927
 Absorption-Costing Approach to Measuring Profit 928
Example 18.3 The HOW and WHY of Calculating Inventory Cost and Preparing the Income Statement Using Absorption Costing 929
 Variable-Costing Approach to Measuring Profit 931
Example 18.4 The HOW and WHY of Calculating Inventory Cost and Preparing the Income Statement Using Variable Costing 932
 Exhibit 18.2 Changes in Inventory Under Absorption and Variable Costing 934
 Profitability of Segments and Divisions 934
 Exhibit 18.3 Alden Company Absorption-Costing Income Statement (In thousands of dollars) 935
 Exhibit 18.4 Alden Company Variable-Costing Income Statement (In thousands of dollars) 936

Analysis of Profit-Related Variances 937
 Sales Price and Sales Volume Variances 937

| | |
|--|-----|
| Example 18.5 The HOW and WHY of Calculating the Sales Price Variance, the Sales Volume Variance, and the Overall Sales Variance | 938 |
| Contribution Margin Variance | 939 |
| Example 18.6 The HOW and WHY of Calculating the Contribution Margin Variance | 939 |
| Example 18.7 The HOW and WHY of Calculating the Contribution Margin Volume Variance | 940 |
| Example 18.8 The HOW and WHY of Calculating the Sales Mix Variance | 942 |
| Market Share and Market Size Variances | 942 |
| Example 18.9 The HOW and WHY of Calculating the Market Share Variance and the Market Size Variance | 943 |
| The Product Life Cycle | 944 |
| Exhibit 18.5 Product Life Cycle and Profitability | 945 |
| Exhibit 18.6 Impact of the Product Life Cycle on Cost Management | 945 |
| Exhibit 18.7 Product Life-Cycle Costs in the ABC Categories | 946 |
| Limitations of Profit Measurement | 947 |

CHAPTER 19

Capital Investment 972

Capital Investment Decisions 974

Payback and Accounting Rate of Return: Nondiscounting Methods 975

Payback Period 976

Example 19.1 The HOW and WHY of Calculating the Payback Period 976

Accounting Rate of Return 977

Example 19.2 The HOW and WHY of Calculating the Accounting Rate of Return 978

The Net Present Value Method 979

Example 19.3 The HOW and WHY of Analyzing NPV 979

Internal Rate of Return 981

Example 19.4 The HOW and WHY of Calculating the Internal Rate of Return 981

NPV Versus IRR: Mutually Exclusive Projects 982

NPV Compared with IRR 983

Exhibit 19.1 NPV and IRR: Conflicting Signals 983

Exhibit 19.2 Modified Comparison of Projects A and B 984

Exhibit 19.3 Modified Cash Flows with Additional Opportunity 984

Example 19.5 The HOW and WHY of Determining NPV and IRR for Mutually Exclusive Projects 984

Computing After-Tax Cash Flows 986

Conversion of Gross Cash Flows to After-Tax Cash Flows 986

Exhibit 19.4 Tax Effects of the Sale of M1 and M2 987

Example 19.6 The HOW and WHY of Calculating After-Tax Cash Flows 988

MACRS Depreciation 989

Exhibit 19.5 MACRS Depreciation Rates 990

Exhibit 19.6 Value of Accelerated Methods Illustrated 991

Capital Investment: Advanced Technology and Environmental Considerations 991

How Investment Differs 992

How Estimates of Operating Cash Flows Differ 992

An Example: Investing in Advanced Technology 993

Exhibit 19.7 Investment Data: Direct, Intangible, and Indirect Benefits 994

Salvage Value 995

Discount Rates 995

Exhibit 19A.1 Present Value of an Uneven Series of Cash Flows 999

Exhibit 19A.2 Present Value of a Uniform Series of Cash Flows 999

Appendix B: Present Value Tables 1001

Exhibit 19B.1 Present Value of \$1 1001

Exhibit 19B.2 Present Value of an Annuity of \$1 in Arrears 1002

CHAPTER 20

Inventory Management: Economic Order Quantity, JIT, and the Theory of Constraints 1018

Just-in-Case Inventory Management 1020

Justifying Inventory 1021

Exhibit 20.1 Traditional Reasons for Carrying Inventory 1021

Economic Order Quantity: A Model for Balancing Acquisition and Carrying Costs 1022

Example 20.1 The HOW and WHY of Calculating the EOQ 1023

Example 20.2 The HOW and WHY of Reordering 1024

Exhibit 20.2 The Reorder Point 1025

An Example Involving Setups 1025

Exhibit 20.3 EOQ and Reorder Point Illustrated 1026

EOQ and Inventory Management 1026

JIT Inventory Management 1027

A Pull System 1028

Setup and Carrying Costs: The JIT/Lean Approach 1028

Due-Date Performance: The JIT (Lean) Solution 1029

Avoidance of Shutdown and Process Reliability:

The JIT/Lean Approach 1030

Exhibit 20.4 Withdrawal Kanban 1031

Exhibit 20.5 Production Kanban 1031

Exhibit 20.6 Vendor Kanban 1031

Exhibit 20.7 The Kanban Process 1032

Discounts and Price Increases: JIT Purchasing Versus Holding Inventories 1033

JIT's Limitations 1033

Basic Concepts of Constrained Optimization 1034

One Binding Internal Constraint 1034

Example 20.3 The HOW and WHY of Solving Constrained Optimization Problems with One Internal Constraint 1035

Multiple Internal Binding Constraints 1036

Exhibit 20.8 Constraint Data: Schaller Company 1036

Example 20.4 The HOW and WHY of Solving Linear Programming Problems with Two Variables 1036

Exhibit 20.9 Graphical Solution 1038

Theory of Constraints 1038

Operational Measures 1038

Five-Step Method for Improving Performance 1040

Exhibit 20.10 Drum-Buffer-Rope System: General Description 1041

Example 20.5 The HOW and WHY of a Drum-Buffer-Rope System 1042

Exhibit 20.11 Drum-Buffer-Rope: Schaller Company 1043

Exhibit 20.12 New Constraint Set: Schaller Company 1044

CHAPTER 21**International Issues in Cost Management 1058****Cost Accounting in the International Environment 1060****Levels of Involvement in International Trade 1061**

Importing and Exporting 1061

Example 21.1 The HOW and WHY of Locating in a Foreign Trade Zone 1062

Wholly Owned Subsidiaries 1064

Joint Ventures 1064

Foreign Currency Exchange 1065

Managing Transaction Risk 1066

Exhibit 21.1 Spot Rates for Major Currencies September 11, 2020 1066

Example 21.2 The HOW and WHY of Exchanging One Currency for Another 1066**Example 21.3** The HOW and WHY of Calculating Exchange Gains and Losses 1068**Example 21.4** The HOW and WHY of Hedging Currency Exchange Rates 1069

Cryptocurrencies 1070

Managing Economic Risk 1071

Managing Translation Risk 1072

Decentralization and Performance Evaluation in the Multinational Firm 1074

Advantages of Decentralization in the MNC 1074

Measuring Performance in the Multinational Firm 1075

Transfer Pricing and the Multinational Firm 1077

Performance Evaluation 1078

Income Taxes and Transfer Pricing 1078

Example 21.5 The HOW and WHY of Using the Comparable Uncontrolled Price Method, the Resale Price Method, and the Cost-Plus Method in Calculating Transfer Prices 1078**Ethics in the International Environment 1080****MAKING THE CONNECTION: INTEGRATIVE EXERCISE PART 4 (CHAPTERS 16–21) 1090**

Glossary 1094

Check Figures 1106

Subject Index 1111

Company Index 1124

Examples 1126

1

Introduction to Cost Management

After studying this chapter, you should be able to:

- 1 Describe cost management and explain how it differs from financial accounting.
- 2 Identify factors and trends affecting the use of cost management.
- 3 Describe how management accountants function within an organization.
- 4 Understand the importance of ethical behavior for management accountants.
- 5 Identify the three forms of certification available to internal accountants.

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THE IMPORTANCE OF COST MANAGEMENT

at The Kroger Company

The Kroger Company represents one of the largest and most respected grocery companies in the United States with annual sales in excess of \$120 billion, over 2,800 stores, more than 460,000 employees, 11 million daily customers, and consistent placement within the top 20 of the annual Fortune 500 list. Kroger supermarket stores average approximately 160,000 square feet in size and cost over \$25 million to build. In addition to being a traditional brick-and-mortar grocery store, Kroger continues to expand its product and service offerings. For example, many new and renovated Kroger stores feature a wine tasting bar, full menu sit-down bistro, ready-to-eat food bar, coffee shop, and an ever-expanding pharmacy. Furthermore, Kroger continues to diversify its service offerings through online ordering and curbside pickup (i.e., where employees shop, bag, and drop off grocery items to customers outside of the store), home grocery delivery, and fuel stations. Kroger also pursues various alternative profit stream activities, such as gift cards, money services (check cashing, money transfers), and other specialty-targeted customer services based on the insights gleaned from Kroger's 10 petabytes of customer loyalty program data.

Given that it generates over \$335 million in daily sales, a casual observer might assume that Kroger does not care much about understanding or controlling its costs. However, nothing could be further from the financial truth. Although Kroger does generate astonishingly large sales, it also operates in an extremely competitive industry with razor-thin profit margins. For example, its sales of \$122.286 billion generate a net income of \$1.64 billion, which is only a 1.34 percent return on sales.¹ In other words, almost 99 percent of Kroger's sales are consumed by its vast expenses! As a result of its thin profit margin, Kroger, like other grocers, cares deeply about cost management. Effectively understanding and managing its numerous costs can mean the difference between being a successful and respected Fortune 20 company and falling into a net loss financial position that struggles to remain in business. Kroger's heavy reliance on effective cost management is typical of most companies. For example, a recent global survey of 1,219 executives (e.g., presidents, chief executive officers, chief financial officers, and chief operational officers) directly involved in cost management within their organizations found that 71 percent of businesses plan to undertake cost reduction initiatives over the next 24 months.² Furthermore, these cost reduction efforts are significant as 66 percent of respondents note that they are targeting cost reductions of 10 percent or higher. Interestingly, 81 percent of respondents report that they have been unable to fully meet their past cost reduction targets, with the majority of these respondents falling 25 or more percent short of meeting their targets. Collectively, these results indicate that cost

¹ See <https://www.wsj.com/market-data/quotes/KR/financials/annual/income-statement>, accessed August 3, 2020.

² O. Aguilar and J. Girzadas, "Deloitte 2019 Global Cost Survey," <https://www2.deloitte.com/global/en/pages/operations/articles/gx-global-cost-management-survey.html>, accessed August 3, 2020.

management represents an extremely important yet challenging endeavor for most organizations, thereby demonstrating the great value of understanding cost management. Therefore, the various cost management topics discussed briefly in this chapter and examined more thoroughly throughout the book apply not only to Kroger but also to most companies.

OBJECTIVE 1

Describe cost management and explain how it differs from financial accounting.

FINANCIAL ACCOUNTING VERSUS COST MANAGEMENT: A SYSTEMS FRAMEWORK

A systems framework helps us understand the variety of topics that appear in the field of cost management. It also facilitates our ability to understand the differences between financial accounting and cost management. An **accounting information system** consists of interrelated manual and computer parts and uses processes such as collecting, recording, summarizing, analyzing, and managing data to transform inputs into information that is provided to users.

The accounting information system within an organization has two major subsystems: (1) *the financial accounting information system* and (2) *the cost management accounting information system*. One of the major differences between the two systems is the targeted user.

Financial Accounting Information System

The **financial accounting** information system is primarily concerned with producing outputs for external users. It uses well-specified economic events as inputs, and its processes follow certain rules and conventions. For financial accounting, the nature of the inputs and the rules and conventions governing processes are defined by the Securities and Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB). Among its outputs are financial statements such as the balance sheet, income statement, and statement of cash flows for external users (investors, creditors, government agencies, and other outside users). Financial accounting information is used for investment decisions, stewardship evaluation, activity monitoring, and regulatory measures.

The Cost Management Information System

The **cost management** information system is primarily concerned with producing outputs for internal users using inputs and processes needed to satisfy management objectives. The cost management information system is not bound by externally imposed criteria that define inputs and processes. Instead, the criteria that govern the inputs and processes are set by people in the company. The cost management information system has three broad objectives that provide information for:

1. Costing out services, products, and other objects of interest to management
2. Planning and control
3. Decision making

The information requirements for satisfying the first objective depend on the nature of the object being costed and the reason management wants to know the cost. For example, product costs that satisfy the FASB rules are needed to value inventories for the balance sheet and to

calculate the cost of goods sold expense on the income statement. These product costs include the cost of materials, labor, and overhead. In other cases, managers may want to know all costs that are associated with a product for purposes of tactical and strategic profitability analysis. If so, then additional cost information may be needed concerning product design, development, marketing, and distribution. For example, pharmaceutical companies, such as **Merck** might want to associate research and development costs with individual drugs or drug families. The desire for management to understand such cost associations is logical given that the development of a single new drug often costs in excess of \$2 billion and faces a regulator approval rate of only 12 percent.³

Cost information also is used for planning and control. It should help managers decide what should be done, why it should be done, how it should be done, and how well it is being done. For example, information about the expected revenues and costs for a new product could be used as an input for target costing. At this stage, the expected revenues and costs may cover the entire life of the new product. Thus, projected costs of design, development, testing, production, marketing, distribution, and servicing would be essential information.

Finally, cost information is a critical input for many managerial decisions. For example, a manager may need to decide whether to continue making a component internally or to buy it from an external supplier. In this case, the manager would need to know the cost of materials, labor, and other productive inputs associated with the manufacture of the component and which of these costs would vanish if the product is no longer produced. Also needed is information concerning the cost of purchasing the component, including any increase in cost for internal activities such as receiving and storing goods. As illustrated by this example, companies increasingly utilize a proactive cost management perspective to improve resource allocation and investment decisions across the company.

Cost management has a much broader focus than that found in traditional costing systems. It is concerned not only with how much something costs but also with the factors that drive costs, such as cycle time, quality, and process productivity. Thus, cost management requires a deep understanding of a firm's cost structure. Managers must be able to determine the long- and short-run costs of activities and processes as well as the costs of goods, services, customers, suppliers, and other objects of interest. Causes of these costs are also carefully studied.

Different Systems for Different Purposes

The financial accounting and cost management systems show us that different systems exist to satisfy different purposes. As indicated, these two systems are subsystems of the accounting information system. The cost management information system also has two major subsystems: *the cost accounting information system* and *the operational control information system*. The objectives of these two subsystems correspond to the first and second objectives mentioned earlier for the cost management information system (the costing and control objectives). The output of these two cost systems satisfies the third objective (the decision-making objective).

The **cost accounting information system** is a cost management subsystem designed to assign costs to individual products and services and other objects as specified by management. For external financial reporting, the cost accounting system must assign costs to products in order to value inventories and determine cost of sales. Furthermore, these assignments must conform to the rules and conventions set by the SEC and the FASB.

³ T. Sullivan, "A Tough Road: Cost to Develop One New Drug Is \$2.6 Billion; Approval Rate for Drugs Entering Clinical Development Is Less Than 12%," March 21, 2019, <https://www.policymed.com/2014/12/a-tough-road-cost-to-develop-one-new-drug-is-26-billion-approval-rate-for-drugs-entering-clinical-de.html>, accessed August 3, 2020.

These rules and conventions do not require that all costs assigned to individual products be causally related to the demands of individual products. Thus, using financial accounting principles to define product costs may lead to under- and overstatements of individual product costs. For reporting inventory values and cost of sales, this may not matter. Inventory values and cost of sales are reported in the aggregate, and the under- and overstatements may wash out to the extent that the values reported on the financial statements are reasonably accurate.

At the individual product level, however, distorted product costs can cause managers to make significant decision errors. For example, a manager might erroneously deemphasize and overprice a product that is, in reality, highly profitable. For decision making, accurate product costs are needed. If possible, the cost accounting system should produce product costs that simultaneously are accurate and satisfy financial reporting conventions. If not, then the cost system must produce two sets of product costs: one that satisfies financial reporting criteria and one that satisfies management decision-making needs.

The **operational control information system** is a cost management subsystem designed to provide accurate and timely feedback concerning the performance of managers and others relative to their planning and control of activities. Operational control is concerned with what activities should be performed and assessing how well they are performed. It focuses on identifying opportunities for improvement and helping to find ways to improve. A good operational control information system provides information that helps managers engage in a program of continuous improvement of all aspects of their businesses.

Product cost information plays a role in this process but, by itself, is not sufficient. The information needed for planning and control is broader and encompasses the entire value chain. For example, every profit-making manufacturing and service organization exists to serve customers. Thus, one objective of an operational control system is to improve the value received by customers. Products and services should be produced that fit specific customer needs. (Observe how this affects the design and development system in the value chain.) Quality, affordable prices, and low post-purchase costs for operating and maintaining the product are also important to customers.

A second, related objective is to improve profits by providing this value. Well-designed, quality products that are affordable can be offered only if they also provide an acceptable return to the owners of the company. Cost information concerning quality, different product designs, and post-purchase customer needs is vital for managerial planning and control.

OBJECTIVE 2

Identify factors and trends affecting the use of cost management.

FACTORS AFFECTING THE USE OF COST MANAGEMENT

Worldwide competitive pressures, growth in the service industry, expansion of data analytics, and advances in digital and manufacturing technologies have changed the nature of our economy and caused many manufacturing and service industries to dramatically change the way in which they operate. Changes in these important factors, in turn, have prompted the development of innovative and relevant cost management practices. For example, activity-based accounting systems have been developed and implemented in many organizations. Additionally, the focus of cost management accounting systems has broadened to enable managers to better serve the needs of customers and manage the firm's business processes that are used to create customer value. Furthermore, cost management practices increasingly are informing decisions in important emerging areas such as forensic accounting, enterprise risk management, and business sustainability.

Global Competition

Vastly improved transportation and communication systems have led to a global market for many manufacturing and service firms. Several decades ago, firms neither knew nor cared what similar firms in Japan, Brazil, India, Germany, Africa, and China were producing. These foreign firms were not competitors because their markets were separated by geographical distance. Now, both small and large firms are affected by the opportunities and challenges offered by global competition. **Stillwater Designs**, a small firm that designs and markets Kicker speakers, has significant markets in Europe. The manufacture of the Kicker speakers is mostly outsourced to Asian producers. At the other end of the size scale, **Apple; Google; Mars, Inc.; Procter & Gamble; The Coca-Cola Company;** and **Yum! Brands** have developed sizable markets in China. For example, Apple manufactures over 500,000 iPhones every day in a Chinese factory with 350,000 employees and ships them around the world aboard massive Boeing 747 jets. For example, the 6,300-mile iPhone trek from Zhengzhou, China, to San Francisco, California, takes only three days.⁴ Similarly, service providers, such as investment bankers and management consultants, can communicate with foreign offices instantly. Improved transportation and communication in conjunction with higher quality products that carry lower prices have upped the ante for all firms. This global competitive environment has increased the demand not only for more cost information but also for more accurate cost information. Cost information plays a vital role in reducing costs, improving productivity, and assessing product-line profitability.

Growth in the Service Industry

The service industry—including financial services, transportation, technology, medical, and travel—represents a significant and growing portion of the economy. For example, the global financial services market is estimated at approximately \$25 trillion. Furthermore, the service industry now comprises approximately three quarters of the U.S. economy and employment. Interestingly, new products oftentimes spur the use of new services in order to function as customers desire, such as cars that utilize navigation services and smart televisions that utilize streaming services.⁵ Furthermore, the gig economy, which refers to the use of short-term contracts to provide a service, represents one of the most impactful newer service sectors. For example, many well-known startup service companies, such as **Airbnb, Instacart,** and **Uber,** have arisen out of the gig economy. The significant growth in the service industry has made managers in the industry more conscious of the need to have accurate cost information for planning, controlling, continuous improvement, and decision making. Thus, the changes in the service sector add to the demand for innovative and relevant cost management information.

Advances in Digital Information Technology and the Manufacturing Environment

Significant advances in information technology have led to advancements in the manufacturing environment. For example, **enterprise resource planning (ERP) software** has the objective of providing an integrated system capability—a system that can run all the operations of a company and provide access to real-time data from the various functional areas of a company that span the entire value chain. Extracting and analyzing this real-time data enables managers to continuously improve the efficiency of organizational units and processes. In addition, when combined with ERP systems, automated manufacturing allows for a considerable amount of information to be collected that informs managers about what is happening within an organization. Information can be captured and analyzed regarding product movement through the factory, completed

⁴ D. Barboza, “An iPhone’s Journey, from the Factory Floor to the Retail Store,” *The New York Times*, <https://www.nytimes.com/2016/12/29/technology/iphone-china-apple-stores.html>, accessed August 3, 2020.

⁵ “The American Economy Is Experiencing a Paradigm Shift,” *The Atlantic*, <https://www.theatlantic.com/sponsored/citi-2018/the-american-economy-is-experiencing-a-paradigm-shift/2008/>, accessed August 3, 2020.

production, materials used, scrap generated, and final product cost. The same real-time data usage occurs within service companies as well. For example, **UPS** utilizes its multibillion-dollar investments in information technology to provide customers with cutting-edge services, such as processing an astonishing 295 million daily package tracking requests from customers.

As a result of these technological advances in information technology, cost accountants have the flexibility to respond to the managerial need for more complex product costing methods, such as activity-based costing (ABC). Simplified and improved costing systems such as time-driven activity-based costing (TDABC) have been developed in order to deal with these issues while preserving the benefits of enhanced accuracy. ABC software is classified as online analytic software and facilitates improved decision making around areas such as cost estimation, product pricing, and planning and budgeting. This vast computing capability now makes it possible for accountants to generate individualized reports on an as-needed basis.

Furthermore, manufacturing management approaches such as the theory of constraints and just-in-time have allowed firms to increase quality, reduce inventories, eliminate waste, and reduce costs. Product costing systems, control systems, allocation, inventory management, cost structure, capital budgeting, variable costing, and many other accounting practices are being affected as well.

Theory of Constraints The **theory of constraints** is a method used to continuously improve manufacturing and nonmanufacturing activities. It is characterized as a “thinking process” that begins by recognizing that all resources are finite. Some resources, however, are more critical than others. The most critical limiting factor, called a *constraint*, becomes the focus of attention. By managing this constraint, performance can be improved. To manage the constraint, it must be identified and exploited (i.e., performance must be maximized subject to the constraint). All other actions are subordinate to the exploitation decision. Finally, to improve performance, the constraint must be elevated. The process is repeated until the constraint is eliminated (i.e., it is no longer the critical performance-limiting factor). The process then begins anew with the resource that has now become the critical limiting factor. Using this method, lead times and, thus, inventories can be reduced.

Just-in-Time Manufacturing A demand-pull system, **just-in-time (JIT) manufacturing**, strives to produce a product only when it is needed and only in the quantities demanded by customers. Demand, measured by customer orders, pulls products through the manufacturing process. Each operation produces only what is necessary to satisfy the demand of the succeeding operation. No production takes place until a signal from a succeeding process indicates the need to produce. Parts and materials arrive just in time to be used in production. JIT manufacturing typically reduces inventories to much lower levels than those found in conventional systems, increases the emphasis on quality control, and produces fundamental changes in the way production is organized and carried out. Basically, JIT manufacturing focuses on continual improvement by reducing inventory costs and dealing with other economic problems. Reducing inventories frees up capital that can be used for more productive investments. Increasing quality enhances the competitive ability of the firm. Finally, changing from a traditional manufacturing setup to JIT manufacturing allows the firm to focus more on quality and productivity and, at the same time, allows a more accurate assessment of what it costs to produce products.

Lean Manufacturing JIT is a critical part of a more comprehensive approach referred to as *lean manufacturing*. **Lean manufacturing** is the persistent pursuit and elimination of waste that simultaneously embodies respect for people. Waste is anything that does not add value to the end user (customer). As a result of eliminating waste, lead time is decreased, production processes are streamlined, and costs are decreased. Depending on the nature of the value streams created in lean manufacturing, a more accurate assessment of product costs may result.

Customer Orientation

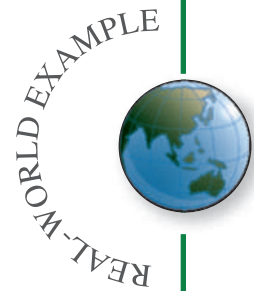
Firms concentrate on the delivery of value to the customer with the objective of establishing a competitive advantage. As such, companies increasingly utilize advances in digital information technologies, including data analytics, to estimate the profitability of their current and potential future customers. For example, during its annual investor conference, **The Kroger Company** (featured in the opening chapter scenario) Chief Financial Officer described the importance it places on customers by referring to the company's "obsession with increasing customer loyalty."⁶ Interestingly, using various data analytic techniques and cost management perspectives, Kroger estimates that the value of a loyal customer is approximately eight times that of a nonloyal customer when considered over time along the value chain. Accountants and managers refer to a firm's **value chain** as the set of activities required to design, develop, produce, market, and deliver products and services to customers. As a result, a key question to be asked about any process or activity is whether it is important to the customer. The cost management system must track information relating to a wide variety of activities important to customers (e.g., product quality, environmental performance, new product development, and delivery performance). Customers now count the delivery of the product or service as part of the product. The cost management system utilizes various techniques to provide insights on these activities. For example, **activity-based management** identifies the activities produced at each stage of the development process and assesses their costs. Also, **target costing** encourages managers to assess the overall cost impact of product designs over the product's life cycle and simultaneously provides incentives to make design changes to reduce costs. Companies must compete not only in technological and manufacturing terms but also in terms of the speed of delivery and response. Firms such as **FedEx** have exploited this desire by identifying and developing a market the **U.S. Postal Service** could not serve.

Companies have internal customers as well. The staff functions of a company exist to serve the line functions. The accounting department creates cost reports for production managers. Accounting departments that are "customer driven" assess the value of the reports to be sure that they communicate significant information in a timely and readable fashion. Reports that do not measure up are dropped.

Total Quality Management

Continuous improvement and elimination of waste are the two foundation principles that govern a state of manufacturing excellence. Manufacturing excellence is the key to survival in today's world-class competitive environment. Producing products and services that actually perform according to specifications and with little waste are the twin objectives of world-class firms. A philosophy of **total quality management**, in which managers strive to create an environment that will enable organizations to produce defect-free products and services, has replaced the acceptable quality attitudes of the past. The emphasis on quality applies to services as well as products.

Advocate Good Samaritan Hospital is an acute care facility located in Downers Grove, Illinois. Good Samaritan Hospital received the Malcolm Baldrige National Quality Award in the health-care category. This award is presented to organizations that demonstrate quality and performance excellence. Furthermore, Good Samaritan Hospital improved its mortality rate (actual mortality/expected mortality) from 0.73 to 0.25. In addition, the ratio of observed to expected renal failures decreased from 3.0 to 0.86. Finally, by creating a culture of patient safety, Good Samaritan Hospital decreased its malpractice expenses by 83 percent, thereby saving \$10 million.



⁶ "Kroger Co (KR) Q3 2019 Earnings Call Transcript," The Motley Fool (December 5, 2015), <https://www.fool.com/earnings/call-transcripts/2019/12/05/kroger-co-kr-q3-2019-earnings-call-transcript.aspx>, accessed August 3, 2020.