

Managerial Accounting

2nd Edition



J. O'Callaghan

Managerial Accounting

by:
J. O'Callaghan

Copyright © 2002 John Wiley & Sons, Inc. All rights reserved.

John Wiley & Sons, Inc.
New York

0471413658

Due to electronic permissions issues, some material may have been removed from this chapter, though reference to it may occur in the text. The University of Phoenix has determined that the content presented herein satisfies the requirements for this course.

Table of Contents

CHAPTER 1

MANAGERIAL ACCOUNTING BASICS.....	5
COMPARING MANAGERIAL AND FINANCIAL ACCOUNTING.....	6
ETHICAL STANDARDS FOR MANAGERIAL ACCOUNTANTS.....	7
MANAGEMENT FUNCTIONS.....	7
MANAGERIAL COST CONCEPTS.....	9
MANUFACTURING COSTS.....	9
PRODUCT VERSUS PERIOD COSTS.....	11
MANUFACTURING COSTS IN FINANCIAL STATEMENTS.....	13
INCOME STATEMENT.....	13
BALANCE SHEET.....	16
COST CONCEPTS-A REVIEW.....	18
CONTEMPORARY DEVELOPMENTS IN MANAGERIAL ACCOUNTING.....	20
SERVICE INDUSTRY TRENDS.....	20
VALUE CHAIN MANAGEMENT.....	22
APPENDIX 1A ACCOUNTING CYCLE FOR A MANUFACTURING COMPANY... 27	
WORK SHEET.....	28
CLOSING ENTRIES.....	30
SUMMARY OF STUDY OBJECTIVE FOR APPENDIX 1A.....	32
GLOSSARY.....	67

CHAPTER 2

COST ACCOUNTING SYSTEMS.....	72
JOB ORDER COST SYSTEM.....	73
PROCESS COST SYSTEM.....	73
JOB ORDER COST FLOW.....	75
ACCUMULATING MANUFACTURING COSTS.....	76
ASSIGNING MANUFACTURING COSTS TO WORK IN PROCESS.....	78
ASSIGNING COSTS TO FINISHED GOODS.....	89
ASSIGNING COSTS TO COST OF GOODS SOLD.....	90
SUMMARY OF JOB ORDER COST FLOWS.....	90
REPORTING JOB COST DATA.....	92
UNDER- OR OVERAPPLIED MANUFACTURING OVERHEAD.....	93
INTERIM BALANCES.....	93
YEAR-END BALANCE.....	94
GLOSSARY.....	130

CHAPTER 3

THE NATURE OF PROCESS COST SYSTEMS.....	136
USES OF PROCESS COST SYSTEMS.....	136

Managerial Accounting
Table of Contents

SIMILARITIES AND DIFFERENCES BETWEEN JOB ORDER COST AND PROCESS COST SYSTEMS.....	138
PROCESS COST FLOW.....	140
ASSIGNMENT OF MANUFACTURING COSTS—JOURNAL ENTRIES.....	140
EQUIVALENT UNITS.....	145
WEIGHTED-AVERAGE METHOD.....	145
REFINEMENTS ON THE WEIGHTED-AVERAGE METHOD.....	146
PRODUCTION COST REPORT.....	148
COMPREHENSIVE EXAMPLE OF PROCESS COSTING.....	149
COMPUTE THE PHYSICAL UNIT FLOW (STEP 1).....	149
COMPUTE EQUIVALENT UNITS OF PRODUCTION (STEP 2).....	150
COMPUTE UNIT PRODUCTION COSTS (STEP 3).....	151
PREPARE A COST RECONCILIATION SCHEDULE (STEP 4).....	152
PREPARING THE PRODUCTION COST REPORT.....	153
FINAL COMMENTS.....	155
APPENDIX 3A FIFO METHOD.....	162
EQUIVALENT UNITS UNDERFIFO.....	162
ILLUSTRATION.....	163
COMPREHENSIVE EXAMPLE.....	164
COMPUTE THE PHYSICAL UNIT FLOW (STEP 1).....	165
COMPUTE EQUIVALENT UNITS OF PRODUCTION (STEP 2).....	166
COMPUTE UNIT PRODUCTION COSTS (STEP 3).....	167
PREPARE A COST RECONCILIATION SCHEDULE (STEP 4).....	168
PREPARING THE PRODUCTION COST REPORT.....	169
FIFO AND WEIGHTED-AVERAGE.....	171
SUMMARY OF STUDY OBJECTIVE FOR APPENDIX 3A.....	171
GLOSSARY.....	207
CHAPTER 4	
ACTIVITY-BASED COSTING VERSUS TRADITIONAL COSTING.....	213
TRADITIONAL COSTING SYSTEMS.....	213
THE NEED FOR A NEW COSTING SYSTEM.....	214
ACTIVITY-BASED COSTING.....	215
ILLUSTRATION OF TRADITIONAL COSTING VERSUS ABC.....	217
UNIT COSTS UNDER TRADITIONAL COSTING.....	217
UNIT COSTS UNDER ABC.....	217
COMPARING UNIT COSTS.....	221
ACTIVITY-BASED COSTING: A CLOSER LOOK.....	224
BENEFITS OF ABC.....	224
LIMITATIONS OF ABC.....	225
WHEN TO SWITCH TO ABC.....	226
VALUE-ADDED VERSUS NONVALUE-ADDED ACTIVITIES.....	226
ACTIVITY-BASED COSTING IN SERVICE INDUSTRIES.....	228

Managerial Accounting
Table of Contents

TRADITIONAL COSTING EXAMPLE.....	229
ACTIVITY-BASED COSTING EXAMPLE.....	230
JUST-IN-TIME PROCESSING.....	232
OBJECTIVE OF JIT PROCESSING.....	233
ELEMENTS OF JIT PROCESSING.....	233
BENEFITS OF JIT PROCESSING.....	234
APPENDIX 4A HIERARCHY OF ACTIVITY LEVELS.....	238
SUMMARY OF STUDY OBJECTIVE FOR APPENDIX 4A.....	241
GLOSSARY.....	280
CHAPTER 5	
COST BEHAVIOR ANALYSIS.....	287
VARIABLE COSTS.....	288
FIXED COSTS.....	289
RELEVANT RANGE.....	290
MIXED COSTS.....	292
IMPORTANCE OF IDENTIFYING VARIABLE AND FIXED COSTS.....	295
COST-VOLUME-PROFIT ANALYSIS.....	296
BASIC COMPONENTS.....	297
CVP INCOME STATEMENT.....	297
BREAK-EVEN ANALYSIS.....	301
MARGIN OF SAFETY.....	307
TARGET NET INCOME.....	308
CVP AND CHANGES IN THE BUSINESS ENVIRONMENT.....	310
CVP INCOME STATEMENT REVISITED.....	313
APPENDIX 5A VARIABLE COSTING.....	317
EFFECTS OF VARIABLE COSTING ON INCOME.....	318
RATIONALE FOR VARIABLE COSTING.....	320
SUMMARY OF STUDY OBJECTIVE FOR APPENDIX 5A.....	321
GLOSSARY.....	344
CHAPTER 6	
BUDGETING BASICS.....	350
BUDGETING AND ACCOUNTING.....	351
THE BENEFITS OF BUDGETING.....	351
ESSENTIALS OF EFFECTIVE BUDGETING.....	352
LENGTH OF THE BUDGET PERIOD.....	352
THE BUDGETING PROCESS.....	352
BUDGETING AND HUMAN BEHAVIOR.....	353
BUDGETING AND LONG-RANGE PLANNING.....	354
THE MASTER BUDGET.....	355
PREPARING THE OPERATING BUDGETS.....	356
SALES BUDGET.....	356
PRODUCTION BUDGET.....	357

Managerial Accounting
Table of Contents

DIRECT MATERIALS BUDGET.....	358
DIRECT LABOR BUDGET.....	360
MANUFACTURING OVERHEAD BUDGET.....	360
SELLING AND ADMINISTRATIVE EXPENSE BUDGET.....	361
BUDGETED INCOME STATEMENT.....	363
PREPARING THE FINANCIAL BUDGETS.....	364
CASH BUDGET.....	364
BUDGETED BALANCE SHEET.....	368
BUDGETING IN NONMANUFACTURING COMPANIES.....	370
MERCHANTISERS.....	370
SERVICE ENTERPRISES.....	372
NOT-FOR-PROFIT ORGANIZATIONS.....	373
GLOSSARY.....	407
CHAPTER 7	
CONCEPT OF BUDGETARY CONTROL.....	413
STATIC BUDGET REPORTS.....	414
ILLUSTRATIONS.....	415
USES AND LIMITATIONS.....	416
FLEXIBLE BUDGETS.....	417
WHY FLEXIBLE BUDGETS?.....	418
DEVELOPING THE FLEXIBLE BUDGET.....	421
FLEXIBLE BUDGET—A CASE STUDY.....	421
FLEXIBLE BUDGET REPORTS.....	424
MANAGEMENT BY EXCEPTION.....	425
THE CONCEPT OF RESPONSIBILITY ACCOUNTING.....	427
CONTROLLABLE VERSUS NONCONTROLLABLE REVENUES AND COSTS... ..	429
RESPONSIBILITY REPORTING SYSTEM.....	430
TYPES OF RESPONSIBILITY CENTERS.....	432
RESPONSIBILITY ACCOUNTING FOR COST CENTERS.....	433
RESPONSIBILITY ACCOUNTING FOR PROFIT CENTERS.....	434
RESPONSIBILITY ACCOUNTING FOR INVESTMENT CENTERS.....	437
PRINCIPLES OF PERFORMANCE EVALUATION.....	440
APPENDIX 7A RESIDUAL INCOME—ANOTHER PERFORMANCE	
MEASUREMENT.....	446
RESIDUAL INCOME COMPARED TOROI.....	447
RESIDUAL INCOME WEAKNESS.....	448
SUMMARY OF STUDY OBJECTIVE FOR APPENDIX 7A.....	449
GLOSSARY.....	485
CHAPTER 8	
THE NEED FOR STANDARDS.....	490
DISTINGUISHING BETWEEN STANDARDS AND BUDGETS.....	491
WHY STANDARD COSTS?.....	491

Managerial Accounting
Table of Contents

INTANGIBLE BENEFITS.....	622
MUTUALLY EXCLUSIVE PROJECTS.....	624
RISK ANALYSIS.....	626
POST-AUDIT OF INVESTMENT PROJECTS.....	627
OTHER CAPITAL BUDGETING TECHNIQUES.....	628
INTERNAL RATE OF RETURN METHOD.....	628
COMPARING DISCOUNTED CASH FLOW METHODS.....	630
ANNUAL RATE OF RETURN METHOD.....	631
GLOSSARY.....	660
CHAPTER 11	
SECTION 1 EXTERNAL SALES.....	666
PRICING IN A COMPETITIVE MARKET.....	668
COST-PLUS PRICING.....	669
LIMITATIONS OF COST-PLUS PRICING.....	671
TIME AND MATERIAL PRICING.....	674
SECTION 2 INTERNAL SALES.....	678
NEGOTIATED TRANSFER PRICES.....	680
NO EXCESS CAPACITY.....	680
EXCESS CAPACITY.....	681
VARIABLE COSTS.....	682
SPECIAL ORDER.....	683
SUMMARY OF NEGOTIATED TRANSFER PRICING APPROACH.....	683
COST-BASED TRANSFER PRICES.....	684
MARKET-BASED TRANSFER PRICES.....	685
EFFECT OF OUTSOURCING ON TRANSFER PRICING.....	686
TRANSFERS BETWEEN DIVISIONS IN DIFFERENT COUNTRIES.....	686
APPENDIX 11A OTHER COST APPROACHES TO PRICING.....	691
ABSORPTION COST APPROACH.....	691
CONTRIBUTION (VARIABLE COST) APPROACH.....	694
SUMMARY OF STUDY OBJECTIVE FOR APPENDIX 11A.....	696
COMPREHENSIVE PROBLEM: CHAPTERS 1-11.....	723
GLOSSARY.....	730
CHAPTER 12	
THE STATEMENT OF CASH FLOWS: PURPOSE AND FORMAT.....	735
PURPOSE OF THE STATEMENT OF CASH FLOWS.....	736
MEANING OF "CASH FLOWS".....	736
CLASSIFICATION OF CASH FLOWS.....	737
SIGNIFICANT NONCASH ACTIVITIES.....	738
FORMAT OF THE STATEMENT OF CASH FLOWS.....	740
THE CORPORATE LIFE CYCLE.....	741
USEFULNESS OF THE STATEMENT OF CASH FLOWS.....	743
PREPARING THE STATEMENT OF CASH FLOWS.....	744

Managerial Accounting
Table of Contents

INDIRECT AND DIRECT METHODS.....	745
SECTION 1 STATEMENT OF CASH FLOWS – INDIRECT METHOD.....	747
FIRST YEAR OF OPERATIONS – 2002.....	747
STEP 1: DETERMINE THE NET INCREASE/DECREASE IN CASH.....	748
STEP 2: DETERMINE NET CASH PROVIDED/USED BY OPERATING ACTIVITIES.....	749
STEP 3: DETERMINE NET CASH PROVIDED/USED BY INVESTING AND FINANCING ACTIVITIES.....	751
STATEMENT OF CASH FLOWS – 2002.....	752
SECOND YEAR OF OPERATIONS – 2003.....	753
STEP 1: DETERMINE THE NET INCREASE/DECREASE IN CASH.....	754
STEP 2: DETERMINE NET CASH PROVIDED/USED BY OPERATING ACTIVITIES.....	754
STEP 3: DETERMINE NET CASH PROVIDED/USED BY INVESTING AND FINANCING ACTIVITIES.....	756
STATEMENT OF CASH FLOWS – 2003.....	758
SUMMARY OF CONVERSION TO NET CASH PROVIDED BY OPERATING ACTIVITIES – INDIRECT METHOD.....	758
SECTION 1 STATEMENT OF CASH FLOWS – DIRECT METHOD.....	762
FIRST YEAR OF OPERATIONS – 2002.....	762
STEP 1: DETERMINE THE NET INCREASE/DECREASE IN CASH.....	764
STEP 2: DETERMINE NET CASH PROVIDED/USED BY OPERATING ACTIVITIES.....	764
STEP 3: DETERMINE NET CASH PROVIDED/USED BY INVESTING AND FINANCING ACTIVITIES.....	769
STATEMENT OF CASH FLOWS – 2002.....	770
SECOND YEAR OF OPERATIONS – 2003.....	771
STEP 1: DETERMINE THE NET INCREASE/DECREASE IN CASH.....	772
STEP 2: DETERMINE NET CASH PROVIDED/USED BY OPERATING ACTIVITIES.....	772
STEP 3: DETERMINE NET CASH PROVIDED/USED BY INVESTING AND FINANCING ACTIVITIES.....	775
STATEMENT OF CASH FLOWS – 2003.....	776
USING CASH FLOWS TO EVALUATE A COMPANY.....	779
FREE CASH FLOW.....	779
CAPITAL EXPENDITURE RATIO.....	781
ASSESSING LIQUIDITY, SOLVENCY, AND PROFITABILITY USING CASH FLOWS.....	782
GLOSSARY.....	836
CHAPTER 13	
EARNING POWER AND IRREGULAR ITEMS.....	842
DISCONTINUED OPERATIONS.....	843

Managerial Accounting
Table of Contents

EXTRAORDINARY ITEMS.....	844
CHANGES IN ACCOUNTING PRINCIPLE.....	847
COMPREHENSIVE INCOME.....	849
COMPARATIVE ANALYSIS.....	849
HORIZONTAL ANALYSIS.....	851
VERTICAL ANALYSIS.....	855
RATIO ANALYSIS.....	859
LIQUIDITY RATIOS.....	862
SOLVENCY RATIOS.....	867
PROFITABILITY RATIOS.....	870
LIMITATIONS OF FINANCIAL ANALYSIS.....	878
ESTIMATES.....	878
COST....	878
ALTERNATIVE ACCOUNTING METHODS.....	879
ATYPICAL DATA.....	879
DIVERSIFICATION.....	879
GLOSSARY.....	931
APPENDIX A	
THE ANNUAL REPORT.....	935
FINANCIAL HIGHLIGHTS.....	936
Corporate Principles	936
Corporate Profile	937
LETTER TO THE STOCKHOLDERS.....	937
To Our Shareholders	937
Operating Report	939
MANAGEMENT DISCUSSION AND ANALYSIS.....	942
Management's Discussion and Analysis of Financial Condition and Results of Operations	942
FINANCIAL STATEMENTS AND ACCOMPANYING NOTES.....	948
Notes to Consolidated Financial Statements	953
AUDITOR'S REPORT.....	966
Report of Independent Accountants	967
SUPPLEMENTARY FINANCIAL INFORMATION.....	967
APPENDIX B	
APPENDIX C	
NATURE OF INTEREST.....	977
SIMPLE INTEREST.....	978
COMPOUND INTEREST.....	978
SECTION 1 FUTURE VALUE CONCEPTS.....	979
FUTURE VALUE OF A SINGLE AMOUNT.....	979
FUTURE VALUE OF AN ANNUITY.....	982
SECTION 2 PRESENT VALUE CONCEPTS.....	985

Managerial Accounting
Table of Contents

PRESENT VALUE VARIABLES.....	985
PRESENT VALUE OF A SINGLE AMOUNT.....	985
PRESENT VALUE OF AN ANNUITY.....	988
TIME PERIODS AND DISCOUNTING.....	991
COMPUTING THE PRESENT VALUES IN A CAPITAL BUDGETING DECISION	991
GLOSSARY.....	1000
APPENDIX D	
ETHICAL BEHAVIOR FOR PRACTITIONERS OF MANAGEMENT ACCOUNTING AND FINANCIAL MANAGEMENT.....	1001
STANDARDS OF ETHICAL CONDUCT FOR PRACTITIONERS OF MANAGEMENT ACCOUNTING AND FINANCIAL MANAGEMENT.....	1002
COMPETENCE.....	1002
CONFIDENTIALITY.....	1002
INTEGRITY.....	1003
OBJECTIVITY.....	1003
RESOLUTION OF ETHICAL CONFLICT.....	1003
AFTERWORD	
CASE-1....	1007
CARD-MART SWIMS IN THE DOT-COM SEA: JOB ORDER COSTING.....	1007
THE BUSINESS SITUATION.....	1007
CASE-2....	1010
CARD-MART SWIMS IN THE DOT-COM SEA: ACTIVITY-BASED COSTING..	1010
THE BUSINESS SITUATION.....	1011
CASE-3....	1016
CARD-MART SWIMS IN THE DOT-COM SEA: CAPITAL BUDGETING.....	1016
THE BUSINESS SITUATION.....	1016
CASE-4....	1019
CARD-MART SWIMS IN THE DOT-COM SEA: TRANSFER PRICING ISSUES.	1019
THE BUSINESS SITUATION.....	1019
CASE-5....	1022
RICHLAND CIRCULAR CLUB PRO RODEO ROUNDUP.....	1022
THE BUSINESS SITUATION.....	1022

Managerial Accounting
Table of Contents

Chapter 4

Activity-Based Costing

Navigator

- Scan **Study Objectives**
- Read **Feature Story**
- Read **Preview**
- Read text and answer *Before You Go On*
p. 148 □ **p. 156** □ **p. 160** □
- Work **Using the Decision Toolkit**
- Review **Summary of Study Objectives**
- Work **Demonstration Problem**
- Answer **Self-Study Questions**
- Complete *Assignments*

STUDY OBJECTIVES

After studying this chapter, you should be able to:

1. Recognize the difference between traditional costing and activity-based costing.
2. Identify the steps in the development of an activity-based costing system.
3. Know how companies identify the activity cost pools used in activity-based costing.
4. Know how companies identify and use the activity cost drivers in activity-based costing.
5. Understand the benefits and limitations of activity-based costing.
6. Differentiate between value-added and nonvalue-added activities.
7. Apply activity-based costing to service industries.
8. Explain just-in-time (JIT) processing.

Feature Story

THE ABCs OF DONUT MAKING – VIRTUAL-REALITY STYLE

Super Bakery, Inc., created in 1990 by former Pittsburgh Steelers' running back Franco Harris, is a nationwide supplier of mineral-, vitamin-, and protein- enriched donuts and other baked goods to the institutional food market, primarily school systems. Super Bakery is a *virtual corporation*, in which only the core, strategic functions of the business are performed inside the company. The remaining activities—selling, manufacturing, warehousing, and shipping—are outsourced to a network of external companies.

Super Bakery draws these cooperating companies together and organizes the work flow. The goal is to add maximum value to the company while making the minimum investment in permanent staff, fixed assets, and working capital. The results are notable: Super Bakery's sales have grown at an average rate of approximately 20 percent during most of its existence.



One of Super Bakery's challenges has been to control the cost of the outsourced activities. Management suspected a wide variation in the cost of serving customers in different parts of the country. Yet its traditional costing methods were spreading costs over the entire customer base. Each customer's order *appeared* to cost the same amount to complete. In actuality, orders with high profit margins were subsidizing orders with low profit margins.

Super Bakery desired a system that would more accurately assign the costs of each order. With such a system, pricing could be improved.

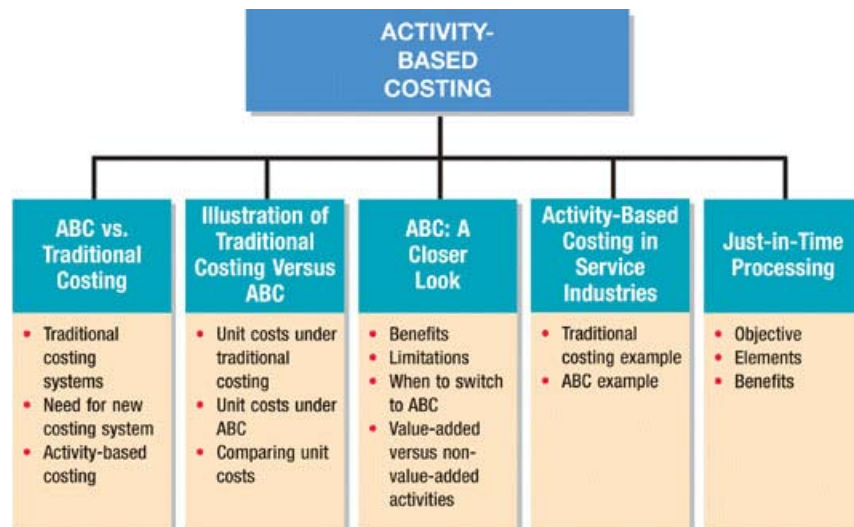
The company looked at and eventually changed to a system that could identify the costs associated with the *activities* performed in the business—manufacturing, sales, warehousing, and shipping. The new activity-based costing system showed that the costs and profit margins on each sale vary significantly. Super Bakery is now able to track the profitability of each customer's account and the performance of outsourced activities. This donut maker, as a result, even knows the cost of the donut holes!

Source: Tom R.V. Davis and Bruce L. Darling, "ABC in a Virtual Corporation," *Management Accounting*, Oct. 1996, pp. 18–26.

PREVIEW OF CHAPTER 4

As indicated in our Feature Story about Super Bakery, Inc., the traditional costing systems described in earlier chapters are not the best answer for every company. Because Super Bakery suspected that the traditional system was masking significant differences in its real cost structure, it sought a new method of assigning costs. Similar searches by other companies for ways to improve operations and gather more accurate data for decision-making have resulted in the development of powerful new management tools, including **activity-based costing (ABC)** and **just-in-time (JIT) processing**. The primary objective of this chapter is to explain and illustrate activity-based costing. A brief overview of just-in-time processing is presented at the end of the chapter.

The content and organization of this chapter are as follows.



ACTIVITY-BASED COSTING VERSUS TRADITIONAL COSTING

TRADITIONAL COSTING SYSTEMS

It is probably impossible to determine the **exact** cost of a product or service. However, in order to achieve improved management decisions, every effort to provide decision makers with the best possible cost estimates must be made. The best estimate of product cost occurs when the costs are traceable directly to the product produced or the service provided. Direct material and direct labor costs are the easiest to trace directly to the product through the use of material requisition forms and payroll time sheets. Overhead costs, on the other hand, are an indirect or common cost that generally cannot be easily or directly traced to individual products or services. Instead, we use estimates to assign overhead costs to products and services.

Often the most difficult part of computing accurate unit costs is determining the proper amount of **overhead cost** to assign to each product, service, or job. In our coverage of job order costing in Chapter 2 and of process costing in Chapter 3, we used a single or plantwide overhead rate throughout the year for the entire factory operation. That rate was called the **predetermined overhead rate**. For job order costing we assumed that **direct labor cost** was the relevant activity base for assigning all overhead costs to jobs. For process costing, we assumed that **machine hours** was the relevant activity base for assigning all overhead to the process or department.

Those assumptions made sense when overhead cost allocation systems were first developed. At that time, direct labor made up a large portion of total manufacturing cost. Therefore, it was widely accepted that there was a high correlation between direct labor and the incurrence of overhead cost. As a result, direct labor became the most popular basis for allocating overhead.

Even in today's increasingly automated environment, direct labor is often the appropriate basis for assigning overhead cost to products. It is appropriate to use direct labor when (a) direct labor constitutes a significant part of total product cost, and (b) a high correlation exists between direct labor and changes in the amount of overhead costs. A simplified (one-stage) traditional costing system relying on direct labor to assign overhead is displayed in Illustration 1.



Traditional one-stage costing system

THE NEED FOR A NEW COSTING SYSTEM

The last decade brought tremendous change to manufacturers and service providers. Advances in computerized systems, technological innovation, global competition, and automation have changed the manufacturing environment drastically. As a result, the amount of direct labor used in many industries has greatly decreased, and total overhead costs resulting from depreciation on expensive equipment and machinery, utilities, repairs, and maintenance have significantly increased. When the correlation between direct labor and overhead no longer exists, it is inappropriate to continue to use plantwide predetermined overhead rates based on direct labor. Companies that continue to use such overhead rates based on direct labor when this correlation does not exist experience significant product cost distortions.

Recognizing these distortions, many companies now use machine hours as the basis on which to allocate overhead in an automated manufacturing environment. But even machine hours may not suffice as the only plantwide basis for allocating all overhead. If the manufacturing process is complex, then only multiple allocation bases can result in more accurate product-cost computations. In such situations, managers need to consider a new overhead cost allocation method that uses multiple bases. That method is **activity-based costing**.

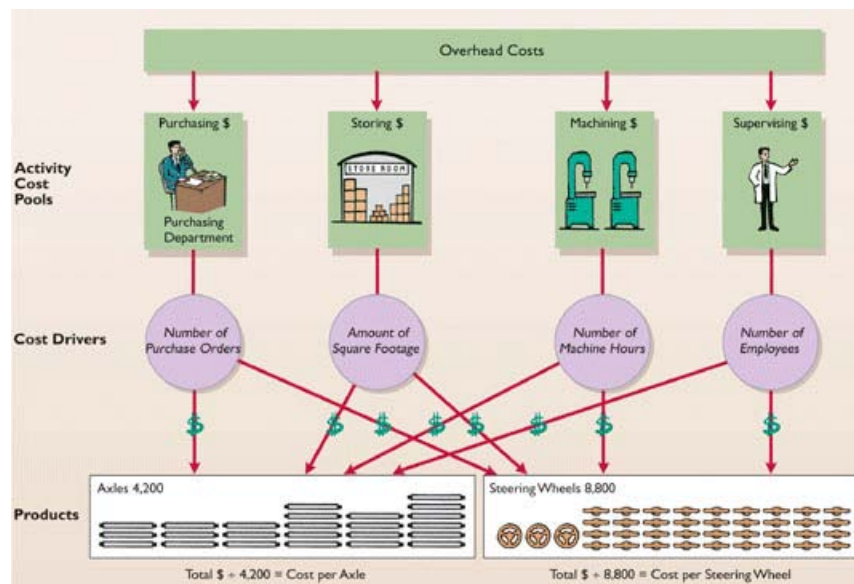
ACTIVITY-BASED COSTING

Activities and Cost Drivers

Activity-based costing (ABC) allocates overhead to multiple activity cost pools, and it then assigns the activity cost pools to products by means of cost drivers. In activity-based costing, an **activity** is any event, action, transaction, or work sequence that incurs cost when producing a product or providing a service. A **cost driver** is any factor or activity that has a direct cause-effect relationship with the resources consumed.

ABC first allocates costs to activity cost pools and then to the products based on each product's use of those activities. The reasoning behind ABC cost allocation is simple: **Products consume activities; activities consume resources.**

ABC allocates overhead in a two-stage process. In the first stage, overhead costs are allocated to **activity cost pools**, rather than to departments. Each cost pool is a distinct type of activity (e.g., ordering materials, setting up machines, assembling, and inspecting). In the second stage, the overhead allocated to the activity cost pools is assigned to products using **cost drivers**. The cost drivers measure the number of individual activities undertaken or performed (e.g., number of purchase orders, number of setups, labor hours, or number of inspections) to produce products or provide services. Examples of activities and the possible cost drivers that measure them are shown in Illustration 2 for a company that manufactures two products—axles and steering wheels.

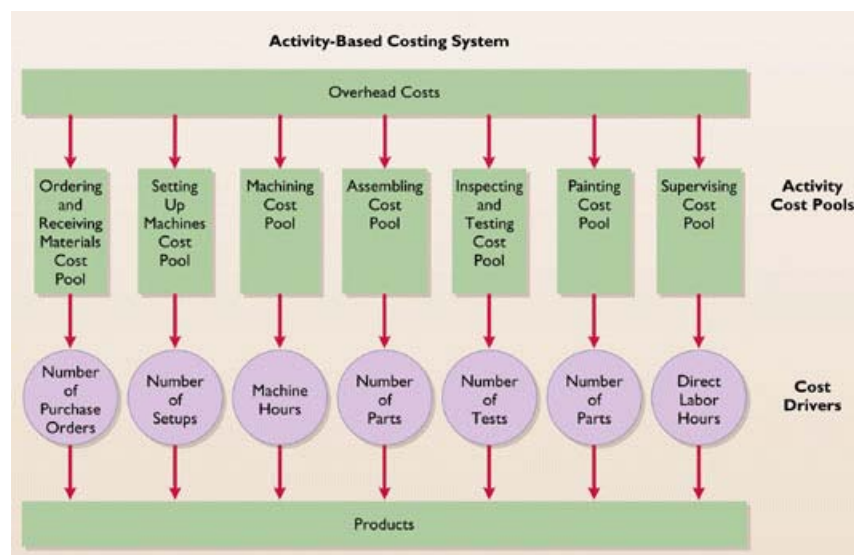


Activities and related cost drivers

In the first step (as shown at the top of the illustration), the company's overhead costs are allocated to activity cost pools. In this simplified example, four activity cost pools have been identified: purchasing, storing, machining, and supervising. After the costs are allocated to the activity cost pools, costs are assigned to the individual products (either axles or steering wheels) based on each product's use of each activity as measured by the cost drivers. For example, if axles require more activity by the purchasing department, as measured by the number of required purchase orders, then more of the overhead cost from the purchasing pool will be allocated to the axles.

As you might imagine, not all products or services share equally in these activities. The more complex a product's manufacturing operation, the more activities and cost drivers it is likely to have. If there is little or no correlation between changes in the cost driver and consumption of the overhead cost, inaccurate product costs are inevitable.

The design of a more complex activity-based costing system with seven activity cost pools is graphically shown in Illustration 3 for Lift Jack Company. Lift Jack Company manufactures two automotive jacks—an automobile scissors jack and a truck hydraulic jack.



ABC system design—Lift Jack Company

The Lift Jack Company illustration contains seven activity cost pools. In some companies the number of activities related to a cost pool can be substantial. For example, at Clark-Hurth (a division of Clark Equipment Company), a manufacturer of axles and transmissions, over 170 activities were identified; at Compumotor (a division of Parker Hannifin) over 80 activities were identified in just the procurement function of its Material Control Department.

ILLUSTRATION OF TRADITIONAL COSTING VERSUS ABC

In this section we present a simple case example that compares traditional costing and activity-based costing and illustrates how ABC eliminates the distortion that can occur in traditional overhead cost allocation.

UNIT COSTS UNDER TRADITIONAL COSTING

Atlas Company produces two automobile antitheft devices, The Boot and The Club. The Boot is a high-volume item totaling 25,000 units annually. The Club is a low-volume item totaling only 5,000 units per year. Each product requires one hour of direct labor for completion. Therefore, total annual direct labor hours are 30,000 (25,000 + 5,000). Expected annual manufacturing overhead costs are \$900,000. Thus, the predetermined overhead rate is \$30 ($\$900,000 \div 30,000$) per direct labor hour.

The direct materials cost per unit is \$40 for The Boot and \$30 for The Club. The direct labor cost is \$12 per unit for each product. The computation of the unit cost for The Boot and The Club under traditional costing is shown in Illustration 4.

ATLAS COMPANY		
Manufacturing Costs	Products	
	The Boot	The Club
Direct materials	\$40	\$30
Direct labor	12	12
Overhead	<u>30*</u>	<u>30*</u>
Total unit cost	<u>\$82</u>	<u>\$72</u>

*Predetermined overhead rate times direct labor hours ($\$30 \times 1\text{hr.} = \30).

Computation of unit costs—traditional costing

UNIT COSTS UNDER ABC

Let's now calculate unit costs under ABC, in order to compare activity-based costing with a traditional costing system. Activity-based costing involves the following four steps.

1. Identify and classify the major activities involved in the manufacture of specific products, and allocate manufacturing overhead costs to the appropriate activity cost pools.
2. Identify the cost driver that has a strong correlation to the costs accumulated in the activity cost pool.

3. Compute the activity-based overhead rate per cost driver.
4. Assign manufacturing overhead costs for each activity cost pool to products, using the activity-based overhead rates (cost per driver).

Step 1—Identify and Classify Activities and Allocate Overhead to Cost Pools

A well-designed activity-based costing system starts with an analysis of the activities performed to manufacture a product or provide a service. This analysis should identify all resource-consuming activities. It requires a detailed, step-by-step walk-through of each operation, documenting every activity undertaken to accomplish a task. Atlas Company identified three activity-cost pools: setting up machines, machining, and inspecting.

Next, overhead costs are assigned directly to the appropriate activity cost pool. For example, all overhead costs directly associated with Atlas Company's machine setups (such as salaries, supplies, and depreciation) would be assigned to the machine setup cost pool. These activity cost pools, along with the estimated overhead allocated to each activity cost pool, are shown in Illustration 5.

ATLAS COMPANY	
Activity Cost Pools	Estimated Overhead
Setting up machines	\$300,000
Machining	500,000
Inspecting	100,000
Total	<u>\$ 900,000</u>

Activity cost pools and estimated overhead

Step 2—Identify Cost Drivers

After costs are allocated to the activity cost pools, the cost drivers for each activity cost pool must be identified. The cost driver must accurately measure the actual consumption of the activity by the various products. To achieve accurate costing, a **high degree of correlation** must exist between the activity cost driver and the actual consumption of the overhead costs in the activity cost pool.

The cost drivers identified by Atlas and their total expected use per activity cost pool are shown in Illustration 6.

Managerial Accounting
Chapter 4

ATLAS COMPANY		
Activity Cost Pools	Cost Drivers	Expected Use of Cost Drivers per Activity
Setting up machines	Number of setups	1,500 setups
Machining	Machine hours	50,000 machine hours
Inspecting	Number of inspections	2,000 inspections

Cost drivers and their expected use

Availability and ease of obtaining data relating to the activity cost driver is an important factor that must be considered in its selection.

Step 3—Compute Overhead Rates

Next, an **activity-based overhead rate** per cost driver is computed by dividing the estimated overhead per activity by the number of cost drivers expected to be used per activity. The formula for this computation is shown in Illustration 7.

$$\frac{\text{Estimated Overhead Per Activity}}{\text{Expected Use of Cost Drivers Per Activity}} = \text{Activity-Based Overhead Rate}$$

Formula for computing activity-based overhead rate

Atlas Company computes its activity-based overhead rates by using total estimated overhead per activity cost pool, shown in Illustration 5, and the total expected use of cost drivers per activity, shown in Illustration 6. The computations are presented in Illustration 8.

Managerial Accounting
Chapter 4

ATLAS COMPANY			
Activity Cost Pools	Estimated ÷ Overhead	Expected Use of Cost Drivers per Activity	= Activity-Based Overhead Rates
Setting up machines	\$300,000	1,500 setups	\$200 per setup
Machining	500,000	50,000 machine hours	\$10 per machine hour
Inspecting	100,000	2,000 inspections	\$50 per inspection
Total	<u>\$900,000</u>		

Computation of activity-based overhead rates

Step 4—Assign Overhead Costs to Products under ABC

In assigning overhead costs, it is necessary to know the expected use of cost drivers **for each product**. Because of its low volume, The Club requires more setups and inspections than The Boot. The expected use of cost drivers per product for each of Atlas's products is shown in Illustration 9.

ATLAS COMPANY				
Activity Cost Pools	Cost Drivers	Expected Use of Cost Drivers per Activity	Expected Use of Cost Drivers per Product	
			The Boot	The Club
Setting up machines	Number of setups	1,500 setups	500	1,000
Machining	Machine hours	50,000 machine hours	30,000	20,000
Inspecting	Number of inspections	2,000 inspections	500	1,500

Expected use of cost drivers per product

To assign overhead costs to each product, the activity-based overhead rates per cost driver (Illustration 8) are multiplied by the number of cost drivers expected to be used per product (Illustration 9). The amount of overhead cost assigned to each product for Atlas Company is shown in Illustration 10.

Managerial Accounting
Chapter 4

ATLAS COMPANY						
Activity Cost Pools	The Boot			The Club		
	Expected Use of Cost Drivers per Product	×	Activity-Based Overhead Rates	=	Assigned	
Setting up machines	500		\$200		\$100,000	
Machining	30,000		\$10		300,000	
Inspecting	500		\$50		25,000	
Total assigned costs [(a)]					<u>\$425,000</u>	<u>\$475,000</u>
Units produced [(b)]					<u>25,000</u>	<u>5,000</u>
Overhead cost per unit [(a) ÷ (b)]					<u>\$17</u>	<u>\$95</u>

Assignment of activity cost pools to products

These data show that under ABC, overhead costs are shifted from the high-volume product (The Boot) to the low-volume product (The Club). This shift results in more accurate costing for two reasons:

1. Low-volume products often require more special handling, such as more machine setups and inspections, than high-volume products. This is true for Atlas Company. Thus, the low-volume product frequently is responsible for more overhead costs per unit than is a high-volume product.¹
2. Assigning overhead using ABC will usually increase the cost per unit for low-volume products. Therefore, a traditional overhead allocation such as direct labor hours is usually a poor cost driver for assigning overhead costs to low-volume products.

COMPARING UNIT COSTS

A comparison of unit manufacturing costs under traditional costing and ABC shows the following significant differences.

ATLAS COMPANY				
Manufacturing Costs	The Boot		The Club	
	Traditional Costing	ABC	Traditional Costing	ABC
Direct materials	\$40	\$40	\$30	\$30
Direct labor	12	12	12	12
Overhead	30	17	30	95
Total cost per unit	\$82	\$69	\$72	\$137
	Overstated \$13		Understated \$65	

Comparison of unit product costs

The comparison shows that unit costs under traditional costing are significantly distorted. The cost of producing The Boot is overstated \$13 per unit (\$82 – \$69), and the cost of producing The Club is understated \$65 per unit (\$137 – \$72). These differences are attributable entirely to how manufacturing overhead is assigned. A likely consequence of the differences in assigning overhead is that Atlas Company has been overpricing The Boot and possibly losing market share to competitors. Moreover, it has been sacrificing profitability by underpricing The Club.

International Perspective

Activity-based costing was pioneered in the United States: John Deere Company coined the term less than 25 years ago. Although ABC has been adopted by numerous well-known U.S. companies including IBM, AT&T, Hewlett-Packard, Procter and Gamble, Tektronix, Hughes Aircraft, Caterpillar, American Express, and Compaq Computer, its use outside the U.S. is limited. The cost of implementation may discourage some foreign companies.

In Japan, where activity-based costing is less used, companies prefer volume measures such as direct labor hours to assign overhead cost to products. Japanese managers are convinced that reducing direct labor is essential to continuous cost reduction. And, using direct labor as the basis for overhead allocation forces Japanese companies to watch direct labor more closely. Possibly, labor cost reduction is more of a priority than developing more accurate product costs.

Before You Go On...

Review It

1. Historically, why has direct labor hours been the most popular basis for allocating overhead costs to products?
2. What changes have occurred in the industrial environment to diminish the appeal of traditional volume-based overhead allocation systems?
3. What four steps are involved in developing an ABC system?

Do It

1. Lift Jack Company, as shown in Illustration 3, page 143, has seven activity cost pools and two products. It expects to produce 200,000 units of its automobile scissors jack, and 80,000 units of its truck hydraulic jack. Having identified its activity cost pools and the cost drivers for each cost pool, Lift Jack Company accumulated the following data relative to those activity cost pools and cost drivers.

LIFT JACK COMPANY					
Annual Overhead Data			Expected Use of Cost Drivers per Activity	Expected use of Cost Drivers per Product	
Activity Cost Pools	Cost Drivers	Estimated Overhead		Scissors Jacks	Hydraulic Jacks
Ordering and receiving	Purchase orders	\$ 200,000	2,500 orders	1,000	1,500
Machine setup	Setups	600,000	1,200 setups	500	700
Machining	Machine hours	2,000,000	800,000 hours	300,000	500,000
Assembling	Parts	1,800,000	3,000,000 parts	1,800,000	1,200,000
Inspecting and testing	Inspections	700,000	35,000 inspections	20,000	15,000
Painting	Parts	300,000	3,000,000 parts	1,800,000	1,200,000
Supervising	Labor hours	1,200,000	200,000 hours	130,000	70,000
		\$6,800,000			

Using the above data, do the following: (a) Prepare a schedule showing the computations of the activity-based overhead rates per cost driver. (b) Prepare a schedule assigning each activity's overhead cost to the two products. (c) Compute the overhead cost per unit for each product. (d) Comment on the comparative overhead cost per unit.

Action Plan

- Determine the activity-based overhead rate by dividing the estimated overhead per activity by the expected use of cost drivers per activity.
- Assign the overhead of each activity cost pool to the individual products by multiplying the expected use of cost driver per product times the activity-based overhead rate.
- Determine overhead cost per unit by dividing the overhead assigned to each product by the number of units of that product.

Related exercise material: BE4-1, BE4-2, BE4-3, BE4-4, BE4-5, E4-1, E4-2, E4-3, E4-4, E4-5, E4-6, E4-7, and E4-8.

ACTIVITY-BASED COSTING: A CLOSER LOOK

As the use of activity-based costing has grown, both its practical benefits and its limitations have now become apparent.

BENEFITS OF ABC

The primary benefit of ABC is **more accurate product costing**. Here's why:

1. **ABC leads to more cost pools** used to assign overhead costs to products. Instead of one plantwide pool (or even departmental pools) and a single cost driver, numerous activity cost pools with more relevant cost drivers are utilized. Costs are assigned more directly on the basis of the number of cost drivers used to produce each product.
2. **ABC leads to enhanced control over overhead costs.** Under ABC, many overhead costs can be traced directly to activities—some indirect costs can instead be identified as direct costs. Thus, managers have become more aware of their responsibility to control the activities that generate those costs.
3. **ABC leads to better management decisions.** More accurate product costing should contribute to setting selling prices that can help achieve desired product profitability levels. In addition, the more accurate cost data could be helpful in deciding whether to make or buy a product part or component, and sometimes even whether to eliminate a product.

In fact, the determination of what activities drive costs has led to some costs, which were previously accounted for as indirect costs, being accounted for as direct costs. This is because, under ABC, these costs are traceable to specific activities.

Activity-based costing does not change the amount of overhead costs. What it does do, in certain circumstances, is to allocate those overhead costs in a more accurate manner. Furthermore, if the score-keeping is more realistic, more accurate, and better understood, managers should be able to better understand cost behavior and overall profitability.

LIMITATIONS OF ABC

Although ABC systems often provide better product cost data than traditional volume-based systems, there are limitations:

1. **ABC can be expensive to use.** Many companies are discouraged from using ABC by the increased cost of identifying multiple activities and applying numerous cost drivers. Activity-based costing systems are more complex than traditional costing systems—sometimes significantly more complex. So companies must ask, is the cost of implementation greater than the benefits of greater accuracy? Sometimes it may be. For some companies there may be no need to consider ABC at all because their existing system is sufficient. If the costs of ABC outweigh the benefits, then the company should not implement ABC.
2. **Some arbitrary allocations continue.** Even though more overhead costs can be assigned directly to products through ABC's multiple activity cost pools, certain overhead costs remain to be allocated by means of some arbitrary volume-based cost driver such as labor or machine hours.

Service Company Perspective

Although most publicized ABC applications are in manufacturing companies or large service firms, ABC can be applied in a very small service business. Mahany Welding Supply, a small family-run welding service business in Rochester, NY, applied ABC to determine the cost of servicing customers and to identify feasible cost reduction opportunities.

Application of ABC at Mahany Welding's operations provided information about the five employees who are involved in different activities of revenue generation—i.e., delivery of supplies (rural versus city), welding services, repairs, telephone sales, field or door-to-door sales, repeat business sales, and cold-call sales. Activity cost pools were assigned to the five revenue-producing employees using relevant cost drivers. ABC revealed annual net income (loss) by employee as follows: Employee #1, \$65,431; Employee #2, \$35,154; Employee #3, \$13,731; Employee #4, (\$10,957); Employee #5, (\$46,180). This comparative information was an eye-opener to the owner of Mahany Welding—who was Employee #5!





Source: Michael Krupnicki and Thomas Tyson, "Using ABC to Determine the Cost of Servicing Customers," *Management Accounting*, December 31, 1997, pp. 40–46.

WHEN TO SWITCH TO ABC

Activity-based costing is a useful tool and under certain conditions is the appropriate costing system to use. How does a company know when to switch to ABC? The presence of one or more of the following factors would point to ABC as the superior costing system:

1. Product lines differ greatly in volume and manufacturing complexity.
2. Product lines are numerous, diverse, and require differing degrees of support services.
3. Overhead costs constitute a significant portion of total costs.
4. The manufacturing process or the number of products has changed significantly—for example, from labor-intensive to capital-intensive due to automation.
5. Production or marketing managers are ignoring data provided by the existing system and are instead using “bootleg” costing data or other alternative data when pricing or making other product decisions.

The redesign and installation of a new product-costing system is a significant decision that requires considerable cost and a major effort to accomplish. Therefore, financial managers need to be very cautious and deliberative when initiating changes in costing systems. A key factor in implementing a successful ABC system is the support of top management.

DECISION TOOLKIT			
Decision Checkpoints	Info Needed for Decision	Tool to Use for Decision	How to Evaluate Results
			
When should we switch to ABC?	Knowledge of the products or product lines, the manufacturing process, overhead costs, and the needs of managers for accurate cost information	A detailed and accurate cost accounting system; cooperation between accountants and operating managers	Compare the results under both costing systems. If managers are better able to understand and control their operations using ABC, and the costs are not prohibitive, the switch would be beneficial.

VALUE-ADDED VERSUS NONVALUE-ADDED ACTIVITIES

Some companies that have experienced the benefits of activity-based costing have applied it to a broader range of management activities. **Activity-based management (ABM)** is an extension of ABC from a product costing system to a management function that focuses on reducing costs and improving processes and decision making. A refinement of activity-based costing used in ABM is the classification of activities as either value-added or nonvalue-added.

Value-added activities increase the worth of a product or service to customers; they involve resource usage and related costs that customers are willing to pay for. Value-added activities are the functions of actually manufacturing a product or performing a service—they increase the worth of the product or service. Examples of value-added activities in a manufacturing operation are engineering design, machining, assembly, painting, and packaging. Examples of value-added

activities in a service company would be performing surgery, providing legal research for legal services, or delivering packages by a delivery service.

Nonvalue-added activities are production- or service-related activities that simply **add cost to, or increase the time spent on, a product or service without increasing its market value**. Examples of nonvalue-added activities in a manufacturing operation include the repair of machines; the storage of inventory; the moving of raw materials, assemblies, and finished product within the factory; building maintenance; inspections; and inventory control. Examples of nonvalue-added activities in service enterprises might include taking appointments, reception, bookkeeping, billing, traveling, ordering supplies, advertising, cleaning, and computer repair.

After activities are identified and classified in Step 1 of implementing ABC, it should be determined whether the activities are value-added or nonvalue-added. Illustration 12 shows an **activity flowchart**. Activity flowcharts are often used to help identify the activities that will be used in ABC costing. In the top part of this flowchart, activities are identified as value-added or nonvalue-added. The value-added activities are highlighted in red, while the nonvalue-added activities are highlighted in blue.

HEARTLAND MANUFACTURING COMPANY Activity Flowchart													
Activities													
NVA	NVA	NVA	NVA	VA		NVA	NVA	VA	NVA	NVA	NVA	VA	
Receive and Inspect Materials	Move and Store Materials	Move Materials to Production and Wait	Set up Machines	Machining: Drill Lathe		Inspect	Move and Wait	Assembly	Inspect and Test	Move to Storage	Store Finished Goods	Package and Ship	
Current Days	1	12	2.5	1.5	2	1	0.2	6	2	0.3	0.5	14	1
Total Current Average Time = 44 days													
Proposed Days	1	4	1.5	1.5	2	1	0.2	2	2	0.3	0.5	10	1
Total Proposed Average Time = 27 days													
Proposed reduction in nonvalue-added time = 17 days													
VA = Value-added NVA = Nonvalue-added													

Flowchart showing value-added and nonvalue-added activities

In the lower part of the flowchart there are two rows showing the number of days spent on each activity. The first row shows the number of days spent on each activity under the current manufacturing process. The second row shows the number of days spent on each activity under management's proposed reengineered manufacturing process. The proposed changes would reduce time spent on nonvalue-added activities by 17 days. This 17-day improvement would be due entirely to moving inventory more quickly through the nonvalue-added processes—that is, by reducing inventory time in moving, storage, and waiting.

Not all activities labeled nonvalue-added are totally wasteful, nor can they be totally eliminated. For example, although inspection time is a nonvalue-added activity from a customer's perspective, few companies would eliminate their quality control functions. Similarly, moving and waiting

time is nonvalue-added, but it would be impossible to completely eliminate. Nevertheless, when managers recognize the nonvalue-added characteristic of these activities, they are motivated to minimize them as much as possible. Attention to such matters is part of the growing practice of activity-based management which helps managers concentrate on **continuous improvement** of operations and activities.

Management Perspective

Often the best way to improve a process is to learn from observing a different process. At the giant food producer General Mills, production line technicians were flown to North Carolina to observe first-hand how race-car pit crews operate. In a NASCAR car race, the value-added activity is driving toward the finish-line; any time spent in the pit is nonvalue-added. Every split second saved in the pit increases the chances of winning. From what the General Mills technicians learned at the car race, as well as other efforts, they were able to reduce set-up time from 5 hours to just 20 minutes.

ACTIVITY-BASED COSTING IN SERVICE INDUSTRIES

Although initially developed and implemented by manufacturing companies that produce products, activity-based costing has been widely adopted in service industries as well. ABC has been found to be a useful tool in such diverse industries as airlines, railroads, hotels, hospitals, banks, insurance companies, telephone companies, and financial services firms. The overall objective of installing ABC in service firms is no different than it is in a manufacturing company. That objective is to identify the key activities that generate costs and to keep track of how many of those activities are performed for each service provided (by job, service, contract, or customer).

The general approach to identifying activities, activity cost pools, and cost drivers is used by a service company in the same manner as a manufacturing company. Also, the labeling of activities as value-added and nonvalue-added and the attempt to reduce or eliminate nonvalue-added activities as much as possible is just as valid in service industries as in manufacturing operations. What sometimes makes implementation of activity-based costing difficult in service industries is that **a larger proportion of overhead costs are company-wide costs** that cannot be directly traced to specific services provided by the company.

To illustrate the application of activity-based costing to a service enterprise, contrasted to traditional costing, we use a public accounting firm. This illustration is equally applicable to a law firm, consulting firm, architect, or any service firm that performs numerous services for a client as part of a job.

TRADITIONAL COSTING EXAMPLE

Assume that the public accounting firm of Check and Doublecheck prepares the following condensed annual budget (see Illustration 13).

CHECK AND DOUBLECHECK, CPAs Annual Budget		
Revenue		\$2,000,000
Direct labor	\$ 600,000	
Overhead (expected)	<u>1,200,000</u>	
Total costs		<u>1,800,000</u>
Operating income		<u>\$ 200,000</u>
$\frac{\text{Estimated overhead}}{\text{Direct labor cost}} = \text{Predetermined overhead rate}$		
$\frac{\$1,200,000}{\$600,000} = 200\%$		

Condensed annual budget of a service firm under traditional costing

Under traditional costing direct labor is the professional service performed, and it is the basis for overhead application to each audit job. To determine the operating income earned on any job, Check and Doublecheck applies overhead at the rate of 200 percent of actual direct professional labor costs incurred. For example, assume that the firm of Check and Doublecheck records \$70,000 of actual direct professional labor cost during its audit of Plano Molding Company, which was billed an audit fee of \$260,000. Under traditional costing, using 200 percent as the rate for applying overhead to the job, applied overhead and operating income related to the Plano Molding Company audit would be computed as shown in Illustration 14.

CHECK AND DOUBLECHECK, CPAs Plano Molding Company Audit		
Revenue		\$260,000
Less: Direct professional labor	\$ 70,000	
Applied overhead (200% × \$70,000)	<u>140,000</u>	<u>210,000</u>
Operating income		<u>\$ 50,000</u>

Overhead applied under traditional costing system

In this example, only one direct cost item and one overhead application rate are used under traditional costing.

ACTIVITY-BASED COSTING EXAMPLE

Under activity-based costing, Check and Doublecheck's estimated annual overhead costs of \$1,200,000 are distributed to several activity cost pools. Activity-based overhead rates per cost driver are computed by dividing each activity overhead cost pool by the expected number of cost drivers used per activity. Illustration 15 shows an annual overhead budget using an ABC system.

CHECK AND DOUBLECHECK, CPAs Annual Overhead Budget				
Activity Cost Pools	Cost Drivers	Estimated Overhead	Expected Use of Cost Drivers per Activity	Activity-Based Overhead Rates
Secretarial support	Direct professional hours	\$ 210,000	30,000	\$7 per hour
Direct labor fringe benefits	Direct labor cost	240,000	\$600,000	\$0.40 per \$1 labor cost
Printing and photocopying	Working paper pages	20,000	20,000	\$1 per page
Computer support	CPU minutes	200,000	50,000	\$4 per minute
Telephone and postage	None (Traced directly)	71,000	\$71,000	Based on usage
Legal support	Hours used	129,000	860	\$150 per hour
Insurance (professional liability, etc.)	Revenue billed	120,000	\$2,000,000	\$0.06 per \$1 revenue
Recruiting and training	Direct professional hours	210,000	30,000	\$7 per hour
		<u>\$1,200,000</u>		

Condensed annual budget of a service firm under activity-based costing

Note that some of the overhead costs can be directly assigned (see telephone and postage).

The assignment of the individual overhead activity rates to the actual number of activities used in the performance of the Plano Molding audit results in total overhead assigned of \$165,100 as shown in Illustration 16.

CHECK AND DOUBLECHECK, CPAs Plano Molding Company Audit				
Activity Cost Pools	Cost Drivers	Actual Use of Drivers	Activity-Based Overhead Rates	Costs Assigned
Secretarial support	Direct professional hours	3,800	\$7.00	\$ 26,600
Direct labor fringe benefits	Direct labor cost	\$70,000	\$0.40	28,000
Printing and photocopying	Working paper pages	1,800	\$1.00	1,800
Computer support	CPU minutes	8,600	\$4.00	34,400
Telephone and postage	None (Traced directly)			8,700
Legal support	Hours used	156	\$150.00	23,400
Insurance (professional liability, etc.)	Revenue billed	\$260,000	\$0.06	15,600
Recruiting and training	Direct professional hours	3,800	\$7.00	26,600
				<u>\$165,100</u>

Assigning overhead in a service company

Under activity-based costing, overhead costs of \$165,100 are assigned to the Plano Molding Company audit, as compared to \$140,000 under traditional costing. A comparison of total costs and operating margins is shown in Illustration 17.

CHECK AND DOUBLECHECK, CPAs Plano Molding Company Audit				
	Traditional Costing		ABC	
Revenue		\$260,000		\$260,000
Expenses				
Direct professional labor	\$ 70,000		\$ 70,000	
Applied overhead	140,000		165,100	
Total expenses		210,000		235,100
Operating income		\$ 50,000		\$ 24,900
Profit margin		19.2%		9.6%

Comparison of traditional costing with ABC in a service company





The comparison shows that the assignment of overhead costs under traditional costing is distorted. The total cost assigned to performing the audit of Plano Molding Company is greater under activity-based costing by \$25,100, or 18 percent higher, and the profit margin is only half as great. Traditional costing gives the false impression of an operating profit of \$50,000. This is more than double what it is at \$24,900 using ABC.

Before You Go On...

Review It

1. What are the benefits of activity-based costing?
2. What are the limitations of activity-based costing?
3. What factors would indicate ABC as the superior costing system?
4. What is the benefit of classifying activities as value-added and nonvalue-added?
5. What is the primary barrier to effectively implementing ABC in a service company environment?

DECISION TOOLKIT

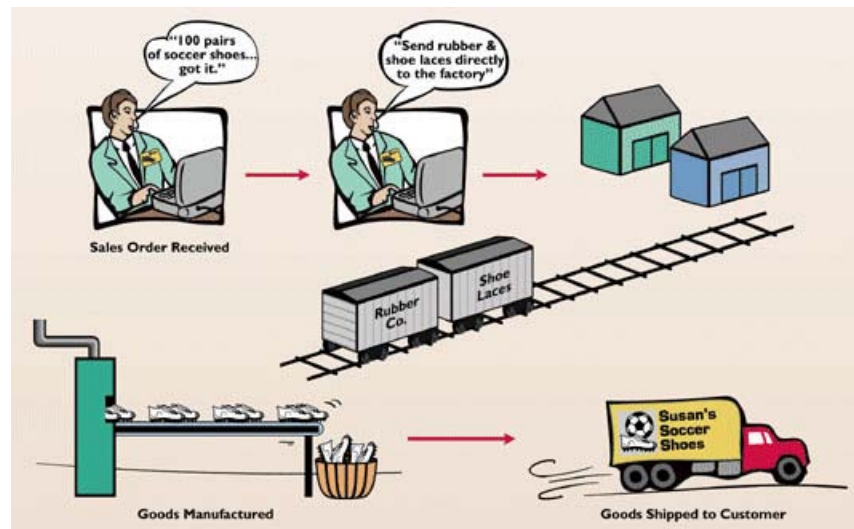
Decision Checkpoints 	Info Needed for Decision 	Tool to Use for Decision 	How to Evaluate Results 
How can ABC help managers manage the business?	Activities classified as value-added and nonvalue-added	The activity analysis flowchart extended to identify each activity as value-added or nonvalue-added	The flowchart should motivate managers to minimize nonvalue-added activities. Managers should better understand the relationship between activities and the resources they consume.

JUST-IN-TIME PROCESSING

The benefit of classifying activities as value-added and nonvalue-added is that managers know which activities to eliminate or minimize in order to reduce costs without affecting production efficiency or product quality. The activity analysis flowcharts shown in Illustration 12 revealed lots of inventory storage and waiting time at several places in the operation. These are nonvalue-added activities. One way to minimize inventory storage and waiting time is to implement a **just-in-time processing system**.

Traditionally, continuous process manufacturing has been based on a **just-in-case** philosophy: Inventories of raw materials are maintained **just in case** some items are of poor quality or a key supplier is shut down by a strike. Similarly, subassembly parts are manufactured and stored **just in case** they are needed later in the manufacturing process. Finished goods are completed and stored **just in case** unexpected and rush customer orders are received. This philosophy often results in a **push approach** in which raw materials and subassembly parts are pushed through each process. Traditional processing often results in the buildup of extensive manufacturing inventories.

Primarily in response to foreign competition, many U.S. firms have switched to **just-in-time (JIT) processing**. JIT manufacturing is dedicated to having the right amount of materials, products, or parts at the time they are needed. Under JIT processing, raw materials are received **just in time** for use in production, subassembly parts are completed **just in time** for use in finished goods, and finished goods are completed **just in time** to be sold. Illustration 18 shows the sequence of activities in just-in-time processing.



Just-in-time processing

OBJECTIVE OF JIT PROCESSING

A primary objective of JIT is to eliminate all manufacturing inventories. Inventories are considered to have an adverse effect on net income because they tie up funds and storage space that could be made available for more productive purposes. JIT strives to eliminate inventories by using a **demand-pull approach** in manufacturing. This approach begins with the customer placing an order with the company. This order, which indicates product demand, starts the process of pulling the product through the manufacturing process. A signal is sent via a computer to the next preceding work station indicating the exact materials (parts and subassemblies) needed for a time period, such as an eight-hour shift, to complete the production of a specified product. The preceding process, in turn, sends its signal to other preceding processes. The goal is a smooth continuous flow in the manufacturing process, with no buildup of inventories at any point.

ELEMENTS OF JIT PROCESSING

There are three important elements in JIT processing:

1. A company must have dependable suppliers who are willing to deliver on short notice exact quantities of raw materials according to precise quality specifications. (This may even include multiple deliveries within the same day.) Suppliers must also be willing to deliver the raw materials at specified work stations rather than at a central receiving department. This type of purchasing requires constant and direct communication with suppliers, which is facilitated by an online computer linkage between the company and its suppliers.

2. A multiskilled work force must be developed. Under JIT, machines are often strategically grouped into work cells or centers and much of the work is automated. As a result, one worker may have the responsibility to operate and maintain several different types of machines.
3. A total quality control system must be established throughout the manufacturing operations. Total quality control means **no defects**. Since only required quantities are signaled by the demand-pull approach, any defects at a work station will shut down operations at subsequent work stations. Total quality control requires continuous monitoring by both employees and supervisors at each work station.

Management Perspective

JIT first hit the USA in the early 1980s when it was adopted by automobile companies to help compete with foreign competition. It is now being successfully used in many companies, including General Electric, Caterpillar, and Harley-Davidson. The effects in most cases have been dramatic. For example, after using JIT for two years, a major division of Hewlett-Packard found that work-in-process inventories (in dollars) were down 82 percent, scrap/rework costs were down 30 percent, space utilization was down 40 percent, and labor efficiency improved 50 percent. As indicated, JIT not only reduces inventory but also enables a manufacturer to produce a better product faster and with less waste.

BENEFITS OF JIT PROCESSING





The major benefits of implementing JIT processing are:

1. Manufacturing inventories are significantly reduced or eliminated.
2. Product quality is enhanced.
3. Rework costs and inventory storage costs are reduced or eliminated.
4. Production cost savings are realized from the improved flow of goods through the processes.

One of the major accounting benefits of JIT is the elimination of separate raw materials and work-in-process inventory accounts. These accounts are replaced by one account called Raw and In-Process Inventory. All materials and conversion costs are charged to this account. Due to the reduction (or elimination) of in-process inventories, the computation of equivalent units of production is simplified.

Managerial Accounting
Chapter 4

DECISION TOOLKIT

Decision Checkpoints 	Info Needed for Decision 	Tool to Use for Decision 	How to Evaluate Results 
Can we benefit from installation and implementation of JIT processing?	Amounts of raw materials, work-in-process, and finished goods inventory; days that inventory is in storage or waiting to be processed or sold	Establish that we have dependable suppliers, a multiskilled work force, and a total quality control system.	JIT should reduce or nearly eliminate inventories, storage, and waiting time and should minimize waste and defects. Inventory should be pulled rather than pushed through each production process.

Before You Go On...

Review It

1. What is the difference between the push approach and the demand-pull approach to handling inventories in a manufacturing operation?
2. What are the major benefits of implementing JIT?
3. What are the principal accounting effects of just-in-time processing?

USING THE DECISION TOOLKIT

Precor Company manufactures a line of high-end exercise equipment of commercial quality. Assume that the chief accountant has proposed changing from a traditional costing system to an activity-based costing system. The financial vice-president is not convinced, so she requests that the next large order for equipment be costed under both systems for purposes of comparison and analysis. An order from Slim-Way Salons, Inc., for 150 low-impact treadmills is received and is identified as the order to be subjected to dual costing. The following cost data relate to the Slim-Way order.

Data relevant to both costing systems

Direct materials	\$55,500
Direct labor hours	820
Direct labor rate per hour	\$18.00

Data relevant to the traditional costing system

Predetermined overhead rate is 300% of direct labor cost.

Data relevant to the activity-based costing system

Activity Cost Pools	Cost Drivers	Activity-Based Overhead Rate	Expected Use of Cost Drivers per Treadmill
Engineering design	Engineering hours	\$30 per hour	330
Machine setup	Setups	\$200 per setup	22
Machining	Machine hours	\$25 per hour	732
Assembly	Number of subassemblies	\$8 per subassembly	1,450
Packaging and shipping	Packaging/shipping hour	\$15 per hours	152
Building occupancy	Machine hours	\$6 per hour	732

Instructions

1. Compute the total cost of the Slim-Way Salons, Inc. order under (a) the traditional costing system and (b) the activity-based costing system. (c) As a result of this comparison, which costing system is Precor likely to adopt? Why?





Summary of Study Objectives

1. **Recognize the difference between traditional costing and activity-based costing.** A traditional costing system allocates overhead to products on the basis of predetermined plantwide or departmentwide volume of unit-based output rates such as direct labor or machine hours. An ABC system allocates overhead to identified activity cost pools, and costs are then assigned to products using related cost drivers that measure the activities (resources) consumed.
2. **Identify the steps in the development of an activity-based costing system.** The development of an activity-based costing system involves four steps: (1) Identify and classify the major activities that pertain to the manufacture of specific products, and allocate manufacturing overhead costs to the appropriate cost pools. (2) Identify the cost driver that has a strong correlation to the costs accumulated in the activity cost pool. (3) Compute the activity-based overhead rate per cost driver. (4) Assign overhead costs for each activity cost pool to products or services using the cost drivers.
3. **Know how companies identify the activity cost pools used in activity-based costing.** To identify activity cost pools, a company must perform an analysis of each operation or process, documenting and timing every task, action, or transaction.
4. **Know how companies identify and use the activity cost drivers in activity-based costing.** Cost drivers identified for assigning activity cost pools must (a) accurately measure the actual consumption of the activity by the various products, and (b) have related data easily available.
5. **Understand the benefits and limitations of activity-based costing.** What makes ABC a more accurate product costing system is: (1) the increased number of cost pools used to assign overhead, (2) the enhanced control over overhead costs, and (3) the better management decisions it makes possible. The limitations of ABC are: (1) the higher analysis and measurement costs that accompany multiple activity centers and cost drivers, and (2) the necessity still to allocate some costs arbitrarily.
6. **Differentiate between value-added and nonvalue-added activities.** Value-added activities increase the worth of a product or service. Nonvalue-added activities simply add cost to, or increase the time spent on, a product or service without increasing its market value. Awareness of these classifications encourages managers to reduce or eliminate the time spent on the nonvalue-added activities.
7. **Apply activity-based costing to service industries.** The overall objective of using ABC in service industries is no different than for manufacturing industries, that is, improved costing of services provided (by job, service, contract, or customer). The general approach to costing is the same: analyze operations, identify activities,

accumulate overhead costs by activity cost pools, and identify and use cost drivers to assign the cost pools to the services.

8. **Explain just-in-time (JIT) processing.** JIT is a processing system that is dedicated to having on hand the right materials and products at the time they are needed, thereby reducing the amount of inventory and the time inventory is held. One of the principal accounting effects is that one account, Raw and In-Process Inventory, replaces both the raw materials and work-in-process inventory accounts.

DECISION TOOLKIT—A SUMMARY

Decision Checkpoints 	Info Needed for Decision 	Tool to Use for Decision 	How to Evaluate Results 
When should we switch to ABC?	Knowledge of the products or product lines, the manufacturing process, overhead costs, and the needs of managers for accurate cost information	A detailed and accurate cost accounting system; cooperation between accountants and operating managers	Compare the results under both costing systems. If managers are better able to understand and control their operations using ABC, and the costs are not prohibitive, the switch would be beneficial.
How can ABC help managers manage the business?	Activities classified as value-added and nonvalue-added	The activity analysis flowchart extended to identify each activity as value-added or nonvalue-added	The flowchart should motivate managers to minimize nonvalue-added activities. Managers should better understand the relationship between activities and the resources they consume.
Can we benefit from installation and implementation of JIT processing?	Amounts of raw materials, work-in-process, and finished goods inventory; days that inventory is in storage or waiting to be processed or sold	Establish that we have dependable suppliers, a multiskilled work force, and a total quality control system.	JIT should reduce or nearly eliminate inventories, storage, and waiting time and should minimize waste and defects. Inventory should be pulled rather than pushed through each production process.

APPENDIX 4A HIERARCHY OF ACTIVITY LEVELS

As mentioned in the chapter, traditional costing systems are volume-driven—driven by unit-based cost drivers such as direct labor or machine hours. Some activity costs are strictly variable and are caused by the production or acquisition of a single unit of product or the performance of a single unit of service. However, the recognition that other activity costs are not driven by unit-based cost drivers has led to the development of a hierarchy of ABC activities, consisting of four levels. The four levels of activities are classified and defined as follows.

1. **Unit-level activities.** These are performed for each unit of production.
2. **Batch-level activities.** These are performed for each batch of products rather than each unit.
3. **Product-level activities.** These are performed in support of an entire product line, but are not always performed every time a new unit or batch of products is produced.

4. **Facility-level activities.** These are required to support or sustain an entire production process.

Greater accuracy in overhead cost allocation may be achieved by recognizing these four different levels of activities and, from them, developing specific activity cost pools and their related cost drivers. Illustration 4A-1 graphically displays this four-level activity hierarchy, along with the types of activities and examples of costs traceable to those activities at each level.





Four Levels	Types of Activities	Examples of Costs
Unit-Level Activities 	Machine-related: Drilling, cutting, milling, trimming, pressing Labor-related: Assembling, painting, sanding, sewing	Direct materials Depreciation of machines Power costs Machine maintenance Direct labor Fringe benefits Payroll taxes
Batch-Level Activities 	Equipment setups Purchase ordering Inspection Material handling	Labor setup costs Purchasing clerical costs Quality control costs Material handling costs
Product-Level Activities 	Product design Engineering changes Inventory management	Design costs Product engineering costs Inventory carrying costs
Facility-Level Activities 	Plant management Personnel administration Training Security	Building depreciation Heating, air conditioning Property taxes Insurance

Figure 4A-1 Hierarchy of Activity Levels

This hierarchy provides managers and accountants a structured way of thinking about the relationships between activities and the resources they consume. In contrast, traditional volume-based costing recognizes only unit-level costs. **Failure to recognize this hierarchy of activities is one of the reasons that volume-based cost allocation causes distortions in product costing.**

As indicated earlier, allocating all overhead costs by unit-based cost drivers can send false signals to managers: Dividing batch-, product-, or facility-level costs by the number of units produced

gives the mistaken impression that these costs vary with the number of units. **The resources consumed by batch-, product-, and facility-level supporting activities do not vary at the unit level**, nor can they be controlled at the unit level. The number of activities performed at the batch level goes up as the number of batches rises—not as the number of units within the batches changes. Similarly, the number of product-level activities performed depends on the number of different products—not on how many units or batches are produced. Furthermore, facility-sustaining activity costs are not dependent upon the number of products, batches, or units produced. Batch-, product-, and facility-level costs can be controlled only by modifying batch-, product-, and facility-level activities.

Before You Go On...

Review It

1. How is the differentiation of activities into unit-level, batch-level, product-level, and facility-level important to managers?

Do It

1. Morgan Toy Company manufactures six primary product lines in its Morganville plant. As a result of an activity analysis, the accounting department has identified eight activity cost pools. Each of the toy products is produced in large batches, with the whole plant devoted to one product at a time. Classify each of the following activities as either unit-level, batch-level, product-level, or facility-level: (a) engineering design, (b) machine setup, (c) inventory management, (d) plant cafeteria, (e) inspections after each setup, (f) polishing parts, (g) assembling parts, (h) health and safety.

Action Plan

- Recall that:

Unit-level activities are performed for each individual unit of product.

Batch-level activities are performed each time a batch of a product is produced.

Product-level activities are performed to support an entire product line.

Facility-level activities support the production process across the entire range of products.

Related exercise material: BE4-9, BE4-10, E4-12, and E4-13.

SUMMARY OF STUDY OBJECTIVE FOR APPENDIX 4A

9 Understand the value of a hierarchy of activity levels to activity-based costing. Activities may be classified as unit-level, batch-level, product-level, and facility-level. Unit-, batch-, product-, and facility-level overhead costs are controlled by modifying unit-, batch-, product-, and facility-level activities, respectively. Failure to recognize this hierarchy of levels can result in distorted product costing.

Demonstration Problem

- Spreadwell Paint Company manufactures two high-quality base paints: an **oil-based** paint and a **latex** paint. Both paints are manufactured in neutral white color only. The white base paints are sold to franchised retail paint and decorating stores where pigments are added to tint (color) the paint as desired by the customer. The oil-based paint is made from, thinned, and cleaned with organic solvents (petroleum products) such as mineral spirits or turpentine. The latex paint is made from, thinned, and cleaned with water; synthetic resin particles are suspended in the water and dry and harden when exposed to the air. Both paints are housepaints. Spreadwell uses the same processing equipment to produce both paints in differing production runs. Between batches, the vats and other processing equipment must be washed and cleaned.

After analyzing the company's entire operations, Spreadwell's accountants and production managers have identified activity cost pools and accumulated annual budgeted overhead costs by pool as follows.

Activity Cost Pools	Estimated Overhead
Purchasing	\$ 240,000
Processing (weighing and mixing, grinding, thinning and drying, straining)	1,400,000
Packaging (quarts, gallons, and 5-gallons)	580,000
Testing	240,000
Storage and inventory control	180,000
Washing and cleaning equipment	560,000
Total annual budgeted overhead	\$3,200,000

Following further analysis, activity cost drivers were identified and their expected use by product and activity were scheduled as follows.

Activity Cost Pool	Cost Drivers	Expected Cost Drivers per Activity	Expected Use of Drivers per Product	
			Oil-based	Latex
Purchasing	Purchase orders	1,500 orders	800	700
Processing	Gallons processed	1,000,000 gals.	400,000	600,000
Packaging	Containers filled	400,000 containers	180,000	220,000
Testing	Number of tests	4,000 tests	2,100	1,900

Managerial Accounting
Chapter 4

Activity Cost Pool	Cost Drivers	Expected Cost Drivers per Activity	Expected Use of Drivers per Product	
			Oil-based	Latex
Storing	Avg. gals. on hand	18,000 gals.	10,400	7,600
Washing	Number of batches	800 batches	350	450

Spreadwell has budgeted 400,000 gallons of oil-based paint and 600,000 gallons of latex paint for processing during the year.

Instructions

- a. Prepare a schedule showing the computations of the activity-based overhead rates.
- b. Prepare a schedule assigning each activity's overhead cost pool to each product.
- c. Compute the overhead cost per unit for each product.
- d. Classify each activity cost pool as value-added or nonvalue-added.

Managerial Accounting
Chapter 4

Solution to Demonstration Problem

a. Computations of activity-based overhead rates:

SPREADWELL PAINT COMPANY			
Activity Cost Pools	Estimated Overhead	÷ Expected Use of Cost Drivers	= Activity-Based Overhead Rates
Purchasing	\$ 240,000	1,500 orders	\$160 per order
Processing	1,400,000	1,000,000 gallons	\$1.40 per gallon
Packaging	580,000	400,000 containers	\$1.45 per container
Testing	240,000	4,000 tests	\$60 per test
Storing	180,000	18,000 gallons	\$10 per gallon
Washing	560,000	800 batches	\$700 per batch
	\$3,200,000		

b. Assignment of activity cost pools to products:

SPREADWELL PAINT COMPANY						
Activity Cost Pools	Oil-Based Paint			Latex Paint		
	Expected Use of Drivers	Overhead Rates	Cost Assigned	Expected Use of Drivers	Overhead Rates	Cost Assigned
Purchasing	800	\$160	\$ 128,000	700	\$160	\$ 112,000
Processing	400,000	\$1.40	560,000	600,000	\$1.40	840,000
Packaging	180,000	\$1.45	261,000	220,000	\$1.45	319,000
Testing	2,100	\$60	126,000	1,900	\$60	114,000
Storing	10,400	\$10	104,000	7,600	\$10	76,000
Washing	350	\$700	245,000	450	\$700	315,000
Total overhead assigned			\$1,424,000			315,000

c. Computation of overhead cost assigned per unit:

	Oil-Based Paint	Latex Paint
Total overhead cost assigned	\$1,424,000	\$1,776,000
Total gallons produced	400,000	600,000
Overhead cost per gallon	\$3.56	\$2.96

d. Value-added activities: processing and packaging
Nonvalue-added activities: purchasing, testing, storing, and washing

Note: All asterisked Questions, Exercises, and Problems relate to material in the appendix to the chapter.

- ¹ Robin Cooper and Robert S. Kaplan, "How Cost Accounting Distorts Product Costs," *Management Accounting* 69, No. 10 (April 1988), pp. 20–27.

SELF-STUDY QUESTIONS

Answers are at the end of the chapter.

1. Activity-based costing (ABC):
 - a. can be used only in a process cost system.
 - b. focuses on units of production.
 - c. focuses on activities performed to produce a product.
 - d. uses only a single basis of allocation.

Hint:

(Study Objective 1)

2. Activity-based costing:
 - a. is the initial phase of converting to a just-in-time operating environment.
 - b. can be used only in a job order costing system.
 - c. is a two-stage overhead cost allocation system that identifies activity cost pools and cost drivers.
 - d. uses direct labor as its primary cost driver.

Hint:

(Study Objective 1)

3. Any activity that causes resources to be consumed is called a:
 - a. just-in-time activity.
 - b. facility-level activity.
 - c. cost driver.
 - d. nonvalue-added activity.

Hint:

(Study Objective 3)

4. The overhead rate for Machine Setups is \$100 per setup. Products A and B have 80 and 60 setups, respectively. The overhead assigned to each product is:

Managerial Accounting
Chapter 4

- a. Product A \$8,000, Product B \$8,000.
- b. Product A \$8,000, Product B \$6,000.
- c. Product A \$6,000, Product B \$6,000.
- d. Product A \$6,000, Product B \$8,000.

Hint:

(Study Objective 4)

5. Donna Crawford Co. has identified an activity cost pool to which it has allocated estimated overhead of \$1,920,000. It has determined the expected use of cost drivers per that activity to be 160,000 inspections. Widgets require 40,000 inspections, Gadgets 30,000 inspections, and Targets, 90,000 inspections. The overhead assigned to each product is:
- a. Widgets \$40,000, Gadgets \$30,000, Targets \$90,000.
 - b. Widgets \$480,000, Gadgets \$360,000, Targets \$108,000.
 - c. Widgets \$360,000, Gadgets \$480,000, Targets \$1,080,000.
 - d. Widgets \$480,000, Gadgets \$360,000, Targets \$1,080,000.

Hint:

(Study Objective 4)

6. An activity that adds costs to the product but does not increase its market value is a:
- a. value-added activity.
 - b. cost driver.
 - c. cost-benefit activity.
 - d. nonvalue-added activity.

Hint:

(Study Objective 6)

7. The following activity is value-added:
- a. Storage of raw materials.
 - b. Moving parts from machine to machine.
 - c. Shaping a piece of metal on a lathe.
 - d. All of the above.

Hint:

(Study Objective 6)

8. Under just-in-time processing:
- raw materials are received just in time for use in production.
 - subassembly parts are completed just in time for use in assembling finished goods.
 - finished goods are completed just in time to be sold.
 - All of the above.

Hint:

(Study Objective 8)

9. The primary objective of just-in-time processing is to:
- accumulate overhead in activity cost pools.
 - eliminate or reduce all manufacturing inventories.
 - identify relevant activity cost drivers.
 - identify value-added activities.

Hint:

(Study Objective 8)

10. A relevant facility-level cost driver for heating costs is:
- machine hours.
 - direct material.
 - floor space.
 - direct labor cost.

Hint:

(Study Objective 9)

QUESTIONS

- Under what conditions is direct labor a valid basis for allocating overhead?
- What has happened in recent industrial history to reduce the usefulness of direct labor as the primary basis for allocating overhead to products?
- In an automated manufacturing environment, what basis of overhead allocation is frequently more relevant than direct labor hours?
- What is generally true about overhead allocation to high-volume products versus low-volume products under a traditional costing system?

5.
 - a. What are the principal differences between activity-based costing (ABC) and traditional product costing?
 - b. What assumptions must be met for ABC costing to be useful?
6. What is the formula for computing activity-based overhead rates?
7. What steps are involved in developing an activity-based costing system?
8. Explain the preparation and use of an activity flowchart in an ABC system.
9. What is an activity cost pool?
10. What is a cost driver?
11. What makes a cost driver accurate and appropriate?
12. What is the formula for assigning activity cost pools to products?
13. What are the benefits of activity-based costing?
14. What are the limitations of activity-based costing?
15. Under what conditions is ABC generally the superior overhead costing system?
16. What refinement has been made to enhance the efficiency and effectiveness of ABC for use in managing costs?
17. Of what benefit is classifying activities as value-added and nonvalue-added?
18. In what ways is the application of ABC to service industries the same as its application to manufacturing companies?
19.
 - a. Describe the philosophy and approach of just-intime processing.
 - b. Identify the major elements of JIT processing.
20. What is the relevance of the hierarchy of levels of activity to ABC?

BRIEF EXERCISES

BE4-1 Mynex Co. identifies the following activities that pertain to manufacturing overhead: Materials Handling, Machine Setups, Factory Machine Maintenance, Factory Supervision, and Quality Control. For each activity, identify an appropriate cost driver.

Hint:

Identify cost drivers.

(Study Objective 4)

BE4-2 Multi-Products Company manufactures four products in a single production facility. The company uses activity-based costing. The following activities have been

Managerial Accounting
Chapter 4

identified through the company's activity analysis: (a) inventory control, (b) machine setups, (c) employee training, (d) quality inspections, (e) material ordering, (f) drilling operations, and (g) building maintenance. For each activity, name a cost driver that might be used to assign overhead costs to products.

Hint:

Identify cost drivers.

(Study Objective 4)

- BE4-3 Martinez Company identifies three activities in its manufacturing process: machine setups, machining, and inspections. Estimated annual overhead cost for each activity is \$180,000, \$325,000, and \$70,000, respectively. The cost driver for each activity and the expected annual usage are: number of setups 2,000, machine hours 25,000, and number of inspections 1,750. Compute the overhead rate for each activity.

Hint:

Compute activity-based overhead rates.

(Study Objective 4)

- BE4-4 Hats Galore, Inc. uses activity-based costing as the basis for information to set prices for its six lines of seasonal hats. Compute the activity-based overhead rates using the following budgeted data for each of the activity cost pools.

Activity Cost Pool	Estimated Overhead	Expected Use of Cost Drivers per Activity
Designing	\$ 450,000	12,000 designer hours
Sizing and cutting	4,000,000	160,000 machine hours
Stitching and trimming	1,400,000	80,000 labor hours
Blocking and packing	336,000	32,000 finished units

Hint:

Compute activity-based overhead rates.

(Study Objective 4)

- BE4-5 Electronic Parts, Inc., a manufacturer of woofers and chips for computers, employs activity-based costing. Compute activity-based overhead rates from the following budgeted data for each of the activity cost pools.

Managerial Accounting
Chapter 4

Activity Cost Pool	Estimated Overhead	Expected Use of Cost Drivers per Activity
Ordering and receiving	\$ 90,000	12,000 orders
Annealing	96,000	32,000 pounds
Etching	447,000	60,000 machine hours
Soldering	1,298,000	440,000 labor hours
Packing and shipping	436,800	28,000 boxes

Hint:

Compute activity-based overhead rates.

(Study Objective 4)

- BE4-6 Norm Johnson Novelty Company identified the following activities in its production and support operations. Classify each of these activities as either value-added or nonvalue-added.
- a. Purchasing.
 - b. Receiving.
 - c. Design engineering.
 - d. Storing inventory.
 - e. Cost accounting.
 - f. Moving work-in-process.
 - g. Inspecting and testing.
 - h. Painting and packing.

Hint:

Classify activities as value- or nonvalue-added.

(Study Objective 6)

- BE4-7 Loggers Construction Company, a builder of log cabins on order for farm machinery storage, identifies the following six activities: (1) receiving and handling materials, (2) painting and maintaining scaffolding, (3) setting poles, (4) siding, (5) roofing, (6) inspecting. Classify each of their activities as value-added or nonvalue-added.

Hint:

Classify activities as value- or nonvalue-added.

(Study Objective 6)

- BE4-8 Ayala and Ortiz is an architectural firm that is contemplating the installation of activity-based costing. The following activities are performed daily by staff

Managerial Accounting
Chapter 4

architects. Classify these activities as value-added or nonvalue-added: (1) designing and drafting, 3 hours; (2) staff meetings, 1 hour; (3) on-site supervision, 2 hours; (4) lunch, 1 hour; (5) consultation with client on specifications, 1.5 hours; (6) entertaining a prospective client for dinner, 2 hours.

Hint:

Classify service company activities as value- or nonvalue-added.

(Study Objective 6 Study Objective 7)

BE4-9 Pete's Pix Center is a large film developing and processing center that serves 130 outlets in grocery stores, service stations, camera and photo shops, and drug stores in 16 nearby towns. The Center operates 24 hours a day, 6 days a week. Classify each of the following activity costs of the Center as either unit-level, batch-level, product-level, or facility-level.

- a. Developing fluids.
- b. Photocopy paper.
- c. Depreciation of machinery.
- d. Setups for enlargements.
- e. Supervisor's salary.
- f. Ordering materials.
- g. Pickup and delivery.
- h. Commission to dealers.
- i. Insurance on building.
- j. Loading developing machines.

Hint:

Classify activities according to level.

(Study Objective 9)

BE4-10 Mechanic's Aids Company operates 20 injection molding machines in the production of tool boxes of four different sizes, named the Apprentice, the Handyman, the Journeyman, and the Professional. Classify each of the following costs as unit-level, batch-level, product-level, or facility-level.

- a. First-shift supervisor's salary.
- b. Powdered raw plastic.
- c. Dies for casting plastic components.
- d. Depreciation on injection molding machines.
- e. Changing dies on machines.

- f. Moving components to assembly department.
- g. Engineering design.
- h. Employee health and medical insurance coverage.

Hint:

Classify activities according to level.

(Study Objective 9)

EXERCISES

- E4-1 Waring Corporation manufactures safes—large mobile safes, and large walk-in stationary bank safes. As part of its annual budgeting process, Waring is analyzing the profitability of its two products. Part of this analysis involves estimating the amount of overhead to be allocated to each product line. The following information relates to overhead.

	Mobile Safes	Walk-in Safes
Units planned for production	200	50
Material moves per product line	300	200
Purchase orders per product line	450	350
Direct labor hours per product line	700	1,700

Instructions

- a. The total estimated manufacturing overhead was \$237,000. Under traditional costing (which assigns overhead on the basis of direct-labor hours), what amount of manufacturing overhead costs are assigned to (do not round):
 - 1. One mobile safe?
 - 2. One walk-in safe?

- b. The total estimated manufacturing overhead of \$237,000 was comprised of \$150,000 for material-handling costs and \$87,000 for purchasing activity costs. Under activity-based costing (ABC):
 - 1. What amount of material handling costs are assigned to:
 - a. One mobile safe?
 - b. One walk-in safe?

Managerial Accounting
Chapter 4

2. What amount of purchasing activity costs are assigned to:
 - a. One mobile safe?
 - b. One walk-in safe?
- c. Compare the amount of overhead allocated to one mobile safe and to one walk-in safe under the traditional costing approach versus under ABC.

Hint:

Assign overhead using traditional costing and ABC.

(Study Objective 1 Study Objective 4)

E4-2 Lieberman Clothing Company manufactures its own designed and labeled sports attire and sells its products through catalog sales and retail outlets. While Lieberman has for years used activity-based costing in its manufacturing activities, it has always used traditional costing in assigning its selling costs to its product lines. Selling costs have traditionally been assigned to Lieberman's product lines at a rate of 60% of direct material costs. Its direct material costs for the month of March for Lieberman's "high intensity" line of attire are \$400,000. The company has decided to extend activity-based costing to its selling costs. Data relating to the "high intensity" line of products for the month of March are as follows.

<u>Activity Cost Pool</u>	<u>Cost Driver</u>	<u>Overhead Rates</u>	<u>Number of Cost Drivers Used per Activity</u>
Sales commissions	Dollar sales	\$0.05 per dollar sales	\$930,000
Advertising—TV/Radio	Minutes	\$300 per minute	250
Advertising—Newspaper	Column inches	\$10 per column inch	3,000
Catalogs	Catalogs mailed	\$2.50 per catalog	60,000
Cost of catalog sales	Catalog orders	\$1 per catalog order	8,500
Credit and collection	Dollar sales	\$0.03 per dollar sales	\$930,000

Instructions

- a. Compute the selling costs to be assigned to the "high-intensity" line of attire for the month of March: (1) using the traditional product costing system (direct material cost is the cost driver), and (2) using activity-based costing.
- b. By what amount does the traditional product costing system undercost or overcost the "high-intensity" product line?

Managerial Accounting
Chapter 4

- c. Classify each of the activities as value-added or nonvalue-added.

Hint:

Assign overhead using traditional costing and ABC; classify activities as value- or nonvalue-added and by level.

(Study Objective 1 Study Objective 4 Study Objective 6)

- E4-3 Nutrition Products, Inc., uses a traditional product costing system to assign overhead costs uniformly to all products. To meet Food and Drug Administration requirements and to assure its customers of safe, sanitary, and nutritious food, Nutrition engages in a high level of quality control. Nutrition assigns its quality-control overhead costs to all products at a rate of 18% of direct-labor costs. Its direct-labor cost for the month of June for its low-calorie dessert line is \$55,000. In response to repeated requests from its financial vice president, Nutrition's management agrees to adopt activity-based costing. Data relating to the low-calorie dessert line for the month of June are as follows.

Activity Cost Pool	Cost Driver	Overhead Rate	Number of Cost Drivers Used per Activity
Inspections of material received	Number of pounds	\$0.60 per pound	6,000 pounds
In-process inspections	Number of servings	\$0.33 per serving	10,000 servings
FDA certification	Customer orders	\$12.00 per order	400 orders

Instructions

- a. Compute the quality-control overhead cost to be assigned to the low-calorie dessert product line for the month of June: (1) using the traditional product costing system (direct labor cost is the cost driver), and (2) using activity-based costing.
- b. By what amount does the traditional product costing system undercost or overcost the low-calorie dessert line?
- c. Classify each of the activities as value-added or nonvalue-added.

Hint:

Assign overhead using traditional costing and ABC; classify activities as value- or nonvalue-added and by level.

(Study Objective 1 Study Objective 4 Study Objective 6)

- E4-4 Quick Copies Company is a small printing and copying firm with three high-speed offset printing presses, five copiers (two color and three black and white), one collator, one cutting and folding machine, and one fax machine. To improve its

Managerial Accounting
Chapter 4

pricing practices, owner-manager Morgan Hough is installing activity-based accounting. Additionally, Morgan employs five employees: two printers/designers, one receptionist/bookkeeper, one sales and copy-machine operator, and one janitor/delivery clerk. Morgan can operate any of the machines and, in addition to managing the entire operation, he performs the training, designing, selling, and marketing functions.

Instructions

As Quick Copies' independent accountant who prepares tax forms and quarterly financial statements, you have been asked to identify the activities that would be used to accumulate overhead costs for assignment to jobs and customers. Using your knowledge of a small printing and copying firm (and some imagination), identify at least twelve activity cost pools as the start of an activity-based costing system for Quick Copies Company.

Hint:

Identify activity cost pools.

(Study Objective 3)

- E4-5 Gulino Corporation manufactures snowmobiles in its White Mountain, Wisconsin plant. The following costs are budgeted for the first quarter's operations.

Direct factory labor-wages	\$ 860,000
Raw material and purchased components	1,200,000
Engineering design	140,000
Engineering development	60,000
Depreciation, plant	210,000
Depreciation, machinery	520,000
Machine setup, wages	15,000
Machine setup, supplies	4,000
Inspections	16,000
Tests	4,000
Insurance, plant	110,000
Property taxes	29,000
Natural gas, heating	19,000
Electricity, plant lighting	21,000
Electricity, machinery	36,000
Custodial (machine maintenance) wages	17,000

Instructions

Classify the above costs of Gulino Corporation into activity cost pools using the following: engineering, machinery, machine setup, quality control, utilities,

maintenance. Next, identify a cost driver that may be used to assign each cost pool to each line of snowmobiles.

Hint:

Identify activity cost pools and cost drivers.

(Study Objective 3 Study Objective 4)

E4-6 Tommy Colina's Rijo Vineyards in Mendocino, California produces three varieties of wine: Merlot, Viognier, and Pinot Noir. His winemaster, Richard Watson, has identified the following activities as cost pools for accumulating overhead and assigning it to products.

1. Culling and replanting. Dead or overcrowded vines are culled, and new vines are planted or relocated. (Separate vineyards by variety.)
2. Trimming. At the end of the harvest the vines are cut and trimmed back in preparation for the next season.
3. Tying. The posts and wires are reset, and vines are tied to the wires for the dormant season.
4. Spraying. The vines are sprayed with chemicals for protection against insects and fungi.
5. Harvesting. The grapes are hand-picked, placed in carts, and transported to the crushers.
6. Stemming and crushing. Cartfuls of bunches of grapes of each variety are separately loaded into machines which remove stems and gently crush the grapes.
7. Pressing and filtering. The crushed grapes are transferred to presses which mechanically remove the juices and filter out bulk and impurities.
8. Fermentation. The grape juice, by variety, is fermented in either stainless-steel tanks or oak barrels.
9. Aging. The wines are aged in either stainless-steel tanks or oak barrels for one to three years depending on variety.
10. Bottling and corking. Bottles are machine-filled and corked.
11. Labeling and boxing. Each bottle is labeled, as is each nine-bottle case, with the name of the vintner, vintage, and variety.
12. Storing. Packaged and boxed bottles are stored awaiting shipment.
13. Shipping. The wine is shipped to distributors and private retailers.
14. Maintenance of buildings and equipment. Printing, repairs, replacements, and general maintenance are performed in the off-season.

15. Heating and air-conditioning of plant and offices.

Instructions

For each of Rijo's fifteen activity cost pools, identify a probable cost driver that might be used to assign overhead costs to its three wine varieties.

Hint:

Identify activity cost drivers.

(Study Objective 4)

- E4-7 Andrea Boss, Inc. manufactures five models of kitchen appliances at its Vista plant. The company is installing activity-based costing and has identified the following activities performed at its Vista plant.

1. Designing new models.
2. Purchasing raw materials and parts.
3. Receiving and inspecting raw materials and parts.
4. Storing and managing inventory.
5. Interviewing and hiring new personnel.
6. Machine forming sheet steel into appliance parts.
7. Manually assembling parts into appliances.
8. Maintaining and repairing machinery and equipment.
9. Insuring all tangible fixed assets.
10. Supervising production.
11. Training all employees of the company.
12. Painting and packaging finished appliances.

Having analyzed its Vista plant operations for purposes of installing activity-based costing, Andrea Boss, Inc. identified its activity cost centers. It now needs to identify relevant activity cost drivers in order to assign overhead costs to its products.

Instructions

Using the activities listed above, identify for each activity one or more cost drivers that might be used to assign overhead to Andrea Boss's five products.

Hint:

Identify activity cost drivers.

(Study Objective 4)

- E4-8 Fribourg Instrument, Inc. manufactures two products: missile range instruments and space pressure gauges. During April, 50 range instruments and 300 pressure

Managerial Accounting
Chapter 4


gauges were produced, and overhead costs of \$89,000 were incurred. An analysis of overhead costs reveals the following activities.

Activity	Cost Driver	Total Cost
1. Materials handling	Number of requisitions	\$35,000
2. Machine setups	Number of setups	27,000
3. Quality inspections	Number of inspections	27,000

The cost driver volume for each product was as follows.

Cost Driver	Instruments	Gauges	Total
Number of requisitions	400	600	1,000
Number of setups	200	300	500
Number of inspections	200	400	600

Instructions

- a. Determine the overhead rate for each activity.
- b. Assign the manufacturing overhead costs for April to the two products using activity-based costing.
- c.  Write a memorandum to the president of Fribourg Instrument explaining the benefits of activity-based costing.

Hint:

Compute overhead rates and assign overhead using ABC.

(Study Objective 4 Study Objective 5)

E4-9 In an effort to expand the usefulness of its activity-based costing system, Tommy Colina's Rijo Vineyards decides to adopt activity-based management techniques. One of these ABM techniques is qualifying its activities as either value-added or nonvalue-added.

Instructions

Using Rijo's list of fifteen activity cost pools in Exercise 4-6, classify each of the activities as either value-added or nonvalue-added.

Hint:

Classify activities as value-added or nonvalue-added.

(Study Objective 6)

Managerial Accounting
Chapter 4

- E4-10 Andrea Boss, Inc. is interested in using its activity-based costing system to improve its operating efficiency and its profit margins by applying activity-based management techniques. As part of this undertaking, you have been asked to classify its Vista plant activities as value-added or nonvalue-added.

Instructions

Using the list of activities identified in Exercise 4-7, classify each activity as either value-added or nonvalue-added.

Hint:

Classify activities as value-added or nonvalue-added.

(Study Objective 6)

- E4-11 Cheatham and Howe is a law firm that is initiating an activity-based costing system. Jim Cheatham, the senior partner and strong supporter of ABC, has prepared the following list of activities performed by a typical attorney in a day at the firm.

Activity	Hours
Writing contracts and letters	1.0
Attending staff meetings	0.5
Taking depositions	1.5
Doing research	1.0
Traveling to/from court	1.0
Contemplating legal strategy	1.0
Eating lunch	1.0
Litigating a case in court	2.5
Entertaining a prospective client	1.5

Instructions

Classify each of the activities listed by Jim Cheatham as value-added or nonvalue-added; be able to defend your classification. How much was value-added time and how much was nonvalue-added?

Hint:

Classify service company activities by level.

(Study Objective 6 Study Objective 7)

- E4-12 Having itemized its costs for the first quarter of next year's budget, Gulino Corporation desires to install an activity-based costing system. First it identified the activity cost pools in which to accumulate factory overhead; second, it identified the relevant cost drivers. (This was done in Exercise 4-5.)

Instructions

Using the activity cost pools identified in Exercise 4-5, classify each of those cost pools as either unit-level, batch-level, product-level, or facility-level.

Hint:

Classify activities by level.

(Study Objective 9)

E4-13 Paul DiGiovanni & Sons, Inc. is a small manufacturing company in Balboa that uses activity-based costing. DiGiovanni & Sons accumulates overhead in the following activity cost pools.

1. Managing parts inventory.
2. Hiring personnel.
3. Purchasing.
4. Designing products.
5. Testing prototypes.
6. Setting up equipment.
7. Inspecting machined parts.
8. Training employees.
9. Machining.
10. Assembling.

Instructions

For each activity cost pool, indicate whether the activity cost pool would be unit-level, batch-level, product-level, or facility-level.

Hint:

Classify activities by level.

(Study Objective 9)

PROBLEMS: SET A

P4-1A Curly-Soo, Inc. manufactures hair curlers and blow-dryers. The handheld hair curler is Curly-Soo's high volume product (80,000 units annually). It is a "large barrel," 20-watt, triple-heat appliance designed to appeal to the teenage market segment with its glow-in-the-dark handle. The handheld blow-dryer is Curly-Soo's lower-volume product (40,000 units annually). It is a three-speed, 2,000 watt appliance with a "cool setting" and a removable filter. It also is designed for the teen market.

Managerial Accounting
Chapter 4

Both products require one hour of direct labor for completion. Therefore, total annual direct labor hours are 120,000, (80,000 + 40,000). Expected annual manufacturing overhead is \$441,600. Thus, the predetermined overhead rate is \$3.68 per direct labor hour. The direct materials cost per unit is \$5.25 for the hair curler and \$9.75 for the blow-dryer. The direct labor cost is \$8.00 per unit for the hair curler and the blow-dryer.

Curly-Soo purchases most of the parts from suppliers and assembles the finished product at its Fargo, North Dakota plant. It recently adopted activity-based costing, which after this year-end will totally replace its traditional direct labor-based cost accounting system. Curly-Soo has identified the following six activity cost pools and related cost drivers and has assembled the following information.

Activity Cost Pool	Cost Driver	Estimated Overhead	Expected Use of Cost Drivers	Expected Use of Cost Drivers per Product	
				Curlers	Dryers
Purchasing	Orders	\$ 57,500	500	170	330
Receiving	Pounds	42,000	168,000	70,000	98,000
Assembling	Parts	169,600	848,000	424,000	424,000
Testing	Tests	52,000	130,000	82,000	48,000
Finishing	Units	60,000	120,000	80,000	40,000
Packing and shipping	Cartons	60,500	12,100	8,040	4,060
		<u>\$441,600</u>			

Instructions

- Under traditional product costing, compute the total unit cost of both products. Prepare a simple comparative schedule of the individual costs by product (similar to Illustration 4).
- Under ABC, prepare a schedule showing the computations of the activity-based overhead rates (per cost driver).
- Prepare a schedule assigning each activity's overhead cost pool to each product based on the use of cost drivers. (Include a computation of overhead cost per unit, rounding to the nearest cent.)
- Compute the total cost per unit for each product under ABC.
- Classify each of the activities as a value-added activity or a nonvalue-added activity.

Managerial Accounting
Chapter 4

- f. Comment on (1) the comparative overhead cost per unit for the two products under ABC, and (2) the comparative total costs per unit under traditional costing and ABC.

Hint:

Assign overhead using traditional costing and ABC; compute unit costs; classify activities as value- or nonvalue-added.

(Study Objective 1 Study Objective 4 Study Objective 6)

P4-2A Petty Plastics, Inc. manufactures two plastic thermos containers at its plastic molding facility in Elum, Washington. Its large container, called the Ice House, has a volume of 5 gallons, side carrying handles, a snap-down lid, and a side drain and plug. Its smaller container, called the Cool Chest, has a volume of 2 gallons, an over-the-top carrying handle which is part of a tilting lid, and a removable shelf. Both containers and their parts are made entirely of hard-molded plastic. The Ice House sells for \$35 and the Cool Chest sells for \$24. The production costs computed per unit under traditional costing for each model in 2002 were as follows.

Traditional Costing	Ice House	Cool Chest
Direct materials	\$ 9.50	\$ 6.00
Direct labor (\$10 per hour)	8.00	5.00
Manufacturing overhead (\$17.20 per DLH)	13.76	8.60
Total per unit cost	\$31.26	\$19.60

In 2002, Petty Plastics manufactured 50,000 units of the Ice House and 20,000 units of the Cool Chest. The overhead rate of \$17.20 per direct labor hour was determined by dividing total expected manufacturing overhead of \$860,000 by the total direct labor hours (50,000) for the 2 models.

Under traditional costing, the gross profit on the two containers was: Ice House \$3.74 or (\$35 – \$31.26), and Cool Chest \$4.40 or (\$24 – \$19.60). The gross margin rates on cost are: Ice House 12% or (\$3.74 ÷ \$31.26), and Cool Chest 22% or (\$4.40 ÷ \$19.60). Because Petty can earn a gross margin rate on the Cool Chest that is nearly twice as great as that earned on the Ice House, with less investment in inventory and labor costs, its management is urging its sales staff to put its efforts into selling the Cool Chest over the Ice House.

Before finalizing its decision, management asks the controller Dinna Martinez to prepare a product costing analysis using activity-based costing (ABC). Martinez accumulates the following information about overhead for the year ended December 31, 2002.


Managerial Accounting
Chapter 4

Activity	Cost Driver	Estimated Overhead	Total Expected Cost Drivers	Activity-Based Overhead Rate
Purchasing	Number of orders	\$180,000	4,500	\$40 per order
Machine setups	Number of setups	200,000	800	\$250 per setup
Extruding	Machine hours	320,000	80,000	\$4 per machine hour
Quality control	Tests and inspections	160,000	8,000	\$20 per test

The cost drivers used for each product were:

Cost Driver	Ice House	Cool Chest	Total
Purchase orders	2,500	2,000	4,500
Machine setups	500	300	800
Machine hours	60,000	20,000	80,000
Tests and inspections	5,000	3,000	8,000

Instructions

- a. Assign the total 2002 manufacturing overhead costs to the two products using activity-based costing (ABC).
- b. What was the cost per unit and gross profit of each model using ABC costing?
- c. 

Are management's future plans for the two models sound?

Hint:

Assign overhead to products using ABC and evaluate decision.

(Study Objective 4)

P4-3A Castro Cabinets Company designs and builds upscale kitchen cabinets for luxury homes. Many of the kitchen cabinet and counter arrangements are custom made, but occasionally the company does mass production on order. Its budgeted manufacturing overhead costs for the year 2003 are as follows.

Managerial Accounting
Chapter 4

Overhead Cost Pools	Amount
Purchasing	\$ 114,400
Handling materials	164,320
Production (cutting, milling, finishing)	400,000
Setting up machines	174,480
Inspecting	184,800
Inventory control (raw materials and finished goods)	252,000
Utilities	360,000
Total budget overhead costs	\$1,650,000

For the last 3 years, Castro Cabinets Company has been charging overhead to products on the basis of machine hours. For the year 2003, 100,000 machine hours are budgeted.

Maribel Castro, owner-manager of Castro, recently directed her accountant, John Kandy, to implement the activity-based costing system he has repeatedly proposed. At Maribel's request, John and the production foreman identify the following cost drivers and their usage for the previously budgeted overhead cost pools.


Overhead Cost Pools	Activity Cost Drivers	Total Drivers
Purchasing	Number of orders	650
Handling materials	Numbers of moves	8,000
Production (cutting, milling, finishing)	Direct labor hours	100,000
Setting up machines	Number of setups	1,200
Inspecting	Number of inspections	6,000
Inventory control (raw materials and finished goods)	Number of components	36,000
Utilities	Square feet occupied	90,000

Kelly Garber, sales manager, has received an order for 50 kitchen cabinet arrangements from Bitty Builders, a housing development contractor. At Kelly's request, John prepares cost estimates for producing components for 50 cabinet arrangements so Kelly can submit a contract price per kitchen arrangement to Bitty Builders. He accumulates the following data for the production of 50 kitchen cabinet arrangements.

Managerial Accounting
Chapter 4

Direct materials	\$180,000
Direct labor	\$200,000
Machine hours	15,000
Direct labor hours	12,000
Number of purchase orders	50
Number of material moves	800
Number of machine setups	100
Number of inspections	450
Number of components (cabinets and accessories)	3,000
Number of square feet occupied	8,000

Instructions

- Compute the predetermined overhead rate using traditional costing with machine hours as the basis. (Round to the nearest cent.)
- What is the manufacturing cost per complete kitchen arrangement under traditional costing?
- What is the manufacturing cost per kitchen arrangement under the proposed activity-based costing? (Prepare all of the necessary schedules.)
-  Which of the two costing systems is preferable in pricing decisions and why?

Hint:

Assign overhead costs using traditional costing and ABC; compare results.

(Study Objective 1 Study Objective 4)

P4-4A Frazzle Corporation produces two grades of wine from grapes that it buys from California growers. It produces and sells, in 1-gallon jugs, roughly 800,000 gallons per year of a low-cost, high-volume product called StarDew. It also produces and sells roughly 200,000 gallons per year of a low-volume, high-cost product called VineRose. VineRose is sold in 1-liter bottles; thus 200,000 gallons results in roughly 800,000 bottles. Based on recent data, the StarDew product has not been as profitable as VineRose. Management is considering dropping the inexpensive StarDew so it can focus more attention on the VineRose line product. VineRose already demands considerably more attention than StarDew.

Tom Edwards, president and founder of Frazzle, is skeptical about this idea. He points out that for many decades the company produced only the StarDew line, and that it was always quite profitable. It wasn't until the company started

Managerial Accounting
Chapter 4

producing the more complicated VineRose wine that the profitability of StarDew declined. Prior to the introduction of VineRose the company had simple equipment, simple growing and production procedures, and virtually no need for quality control. Because VineRose is bottled in 1-liter bottles it requires considerably more time and effort, both to bottle and to label and box, than does StarDew. (There are roughly 4 liters in a gallon; thus the company must bottle and handle 4 bottles of VineRose to sell the same amount of wine as StarDew.) StarDew requires 1 month of aging; VineRose requires 1 year. StarDew requires cleaning and inspection of equipment every 5,000 gallons; VineRose requires such maintenance every 500 gallons.

Tom has asked the accounting department to prepare an analysis of the cost per gallon using the traditional costing approach and using activity-based costing. The following information was collected.


	StarDew	VineRose
Direct materials per gallon	\$1.10	\$2.40
Direct labor cost per gallon	\$0.50	\$1.00
Direct labor hours per gallon	0.075	0.15
Total direct labor hours	60,000	30,000

Activity Cost Pool	Cost Driver	Estimated Overhead	Expected Use of Cost Drivers	Expected Use of Cost Drivers per Product	
				StarDew	VineRose
Grape processing	Cart of grapes	\$ 180,000	10,000	8,000	2,000
Aging	Total months	416,000	10,400,000	800,000	9,600,000
Bottling and corking	Number of bottles	360,000	1,600,000	800,000	800,000
Labeling and boxing	Number of bottles	240,000	1,600,000	800,000	800,000
Maintain, and inspect equipment	Number of inspections	280,000	560	160	400
		\$1,476,000			

Instructions

Answer each of the following questions. (Round all calculations to three decimal places.)

Managerial Accounting
Chapter 4

- a. Under traditional product costing using direct labor hours, compute the total manufacturing cost per **gallon** of both products.
- b. Under ABC, prepare a schedule showing the computation of the activity-based overhead rates (per cost driver).
- c. Prepare a schedule assigning each activity's overhead cost pool to each product, based on the use of cost drivers. Include a computation of overhead cost per unit.
- d. Compute the total manufacturing cost per gallon for both products under ABC.
- e. 
Write a memo to Tom Edwards discussing the implications of your analysis for the company's plans. In this memo provide a brief description of ABC, as well as an explanation of how the traditional approach can result in distortions.

Hint:

Assign overhead costs using traditional costing and ABC; compare results.


(Study Objective 1 Study Objective 4)

- P4-5A Horses and Dogs Veterinary Clinic is a small-town partnership that offers two primary services, farm animal services and pet care services. Providing veterinary care to farm animals requires travel to the farm animal (house calls), while veterinary care to pets generally requires that the pet be brought into the clinic. As part of an investigation to determine the contribution that each of these two types of services makes to overall profit, one partner argues for allocating overhead using activity-based costing while the other partner argues for a more simple overhead cost allocation on the basis of direct labor hours. The partners agree to use next year's budgeted data, as prepared by their public accountant, for analysis and comparison purposes. The following overhead data are collected to develop the comparison.

Managerial Accounting
Chapter 4

Activity Cost Pool	Cost Driver	Estimated Overhead	Total Expected Cost Drivers	Expected Use of Drivers by Service	
				Farm Animals	Pets
Drug treatment	Treatments	\$ 64,000	4,000	1,800	2,200
Surgery	Operations	65,000	800	200	600
Travel	Mileage	28,000	28,000	26,000	2,000
Consultation	Appointment/Calls	33,000	3,000	600	2,400
Accounting/office	Direct labor hours	30,000	5,000	2,000	3,000
Boarding and grooming	100% pets	40,000			
		\$260,000			

Instructions

- a. Using traditional product costing as proposed by the one partner, compute the total overhead cost assigned to both services of Horses and Dogs Veterinary Clinic.
- b.
 1. Using activity-based costing, prepare a schedule showing the computations of the activity-based overhead rates (per cost driver).
 2. Prepare a schedule assigning each activity's overhead cost pool to each service based on the use of the cost drivers.
- c. Classify each of the activities as a value-added activity or a nonvalue-added activity.
- d.  Comment on the comparative overhead cost assigned to the two services under both traditional costing and ABC.

Hint:

Assign overhead costs to services using traditional costing and ABC; compute overhead rates and unit costs; compare results.
(Study Objective 1 Study Objective 4 Study Objective 6 Study Objective 7)

PROBLEMS: SET B

P4-1B Fire Safety Products, Inc. manufactures steel cylinders and nozzles for two models of fire extinguishers: (1) a home fire extinguisher and (2) a commercial fire extinguisher. The **home model** is a high-volume (54,000 units), half-gallon cylinder

Managerial Accounting
Chapter 4

that holds $2\frac{1}{2}$ pounds of multipurpose dry chemical at 480 PSI. The **commercial model** is a low-volume (10,200 units), two-gallon cylinder that holds 10 pounds of multi-purpose dry chemical at 390 PSI. Both products require 1.5 hours of direct labor for completion. Therefore, total annual direct labor hours are 96,300 or $[1.5 \text{ hrs.} \times (54,000 + 10,200)]$. Expected annual manufacturing overhead is \$1,492,780. Thus, the predetermined overhead rate is \$15.50 or $(\$1,492,780 \div 96,300)$ per direct labor hour. The direct materials cost per unit is \$18.50 for the home model and \$26.50 for the commercial model. The direct labor cost is \$19 per unit for both the home and the commercial models.

The company's managers identified six activity cost pools and related cost drivers and accumulated overhead by cost pool as follows.

Activity Cost Pool	Cost Driver	Estimated Overhead	Expected Use of Cost Drivers	Expected Use of Drivers by Product	
				Home	Commercial
Receiving	Pounds	\$ 70,350	335,000	215,000	120,000
Forming	Machine hours	150,500	35,000	27,000	8,000
Assembling	Number of parts	381,600	212,000	162,000	50,000
Testing	Number of tests	51,000	25,500	15,500	10,000
Painting	Gallons	52,080	6,510	4,510	2,000
Packing and shipping	Pounds	787,250	335,000	215,000	120,000
		<u>\$1,492,780</u>			

Instructions

- Under traditional product costing, compute the total unit cost of both products. Prepare a simple comparative schedule of the individual costs by product (similar to Illustration 4).
- Under ABC, prepare a schedule showing the computations of the activity-based overhead rates (per cost driver).
- Prepare a schedule assigning each activity's overhead cost pool to each product based on the use of cost drivers. (Include a computation of overhead cost per unit, rounding to the nearest cent.)
- Compute the total cost per unit for each product under ABC.

Managerial Accounting
Chapter 4

- e. Classify each of the activities as a value-added activity or a nonvalue-added activity.
- f. Comment on (1) the comparative overhead cost per unit for the two products under ABC, and (2) the comparative total costs per unit under traditional costing and ABC.

Hint:

Assign overhead using traditional costing and ABC; compute unit costs; classify activities as value- or nonvalue-added.

(Study Objective 1 Study Objective 4 Study Objective 6)

P4-2B Jackson Electronics manufactures two large-screen television models: the Royale which sells for \$1,600, and a new model, the Majestic, which sells for \$1,300. The production cost computed per unit under traditional costing for each model in 2002 was as follows.

Traditional Costing	Royale	Majestic
Direct materials	\$1,700	\$420
Direct labor (\$20 per hour)	120	100
Manufacturing overhead (\$38 per DLH)	228	190
Total per unit cost	\$1,048	\$710

In 2002, Jackson manufactured 25,000 units of the Royale and 10,000 units of the Majestic. The overhead rate of \$38 per direct labor hour was determined by dividing total expected manufacturing overhead of \$7,600,000 by the total direct labor hours (200,000) for the two models.

Under traditional costing, the gross profit on the models was: Royale \$552 or (\$1,600 – \$1,048), and Majestic \$590 or (\$1,300 – \$710). Because of this difference, management is considering phasing out the Royale model and increasing the production of the Majestic model.

Before finalizing its decision, management asks Jackson's controller to prepare an analysis using activity-based costing (ABC). The controller accumulates the following information about overhead for the year ended December 31, 2002.


Managerial Accounting
Chapter 4

Activity	Cost Driver	Estimated Overhead	Expected Use of Cost Drivers	Activity-Based Overhead Rate
Purchasing	Number of orders	\$1,200,000	40,000	\$30
Machine setups	Number of setups	900,000	18,000	50
Machining	Machine hours	4,800,000	120,000	40
Quality control	Number of inspections	700,000	28,000	25

The cost drivers used for each product were:

Cost Driver	Royale	Majestic	Total
Purchase orders	15,000	25,000	40,000
Machine setups	6,000	12,000	18,000
Machine hours	75,000	45,000	120,000
Inspections	8,000	20,000	28,000

Instructions

- Assign the total 2002 manufacturing overhead costs to the two products using activity-based costing (ABC).
- What was the cost per unit and gross profit of each model using ABC costing?
- 

Are management's future plans for the two models sound? Explain.

Hint:

Assign overhead to products using ABC and evaluate decision.

(Study Objective 4)

P4-3B Customized Stairs Co. of Poway designs and builds factory-made premium wooden stairs for homes. The manufactured stair components (spindles, risers, hangers, hand rails) permit installation of stairs of varying lengths and widths. All are of white oak wood. Its budgeted manufacturing overhead costs for the year 2003 are as follows.

Managerial Accounting
Chapter 4

Overhead Cost Pools	Amount
Purchasing	\$ 57,000
Handling materials	82,000
Production (cutting, milling, finishing)	200,000
Setting up machines	84,840
Inspecting	90,000
Inventory control (raw materials and finished goods)	126,000
Utilities	180,000
Total budget overhead costs	\$819,840

For the last 4 years, Customized Stairs Co. has been charging overhead to products on the basis of machine hours. For the year 2003, 100,000 machine hours are budgeted.

Saida Fang, owner-manager of Customized Stairs Co., recently directed his accountant, Maria Barrila, to implement the activity-based costing system that she has repeatedly proposed. At Saida Fang's request, Maria and the production foreman identify the following cost drivers and their usage for the previously budgeted overhead cost pools.


Overhead Cost Pools	Activity Cost Drivers	Expected Use of Cost Drivers
Purchasing	Number of orders	600
Handling materials	Number of moves	8,000
Production (cutting, milling, finishing)	Direct labor hours	100,000
Setting up machines	Number of setups	1,200
Inspecting	Number of inspections	6,000
Inventory control (raw materials and finished goods)	Number of components	168,000
Utilities	Square feet occupied	90,000

Nick Duich, sales manager, has received an order for 280 stairs from Mall Builders, Inc., a large housing development contractor. At Nick's request, Maria prepares cost estimates for producing components for 280 stairs so Nick can submit a contract price per stair to Mall Builders. She accumulates the following data for the production of 280 stairways.

Managerial Accounting
Chapter 4

Direct materials	\$103,600
Direct labor	\$112,000
Machine hours	14,500
Direct labor hours	5,000
Number of purchase orders	60
Number of material moves	800
Number of machine setups	100
Number of inspections	450
Number of components	16,000
Number of square feet occupied	8,000

Instructions

- Compute the predetermined overhead rate using traditional costing with machine hours as the basis.
- What is the manufacturing cost per stairway under traditional costing?
- What is the manufacturing cost per stairway under the proposed activity-based costing? (Prepare all of the necessary schedules.)
-  Which of the two costing systems is preferable in pricing decisions and why?

Hint:

Assign overhead costs using traditional costing and ABC; compare results.

(Study Objective 1 Study Objective 4)

P4-4B Bastille Corporation produces two grades of wine from grapes that it buys from California growers. It produces and sells roughly 3,000,000 liters per year of a low-cost, high-volume product called CoolDay. It sells this in 600,000 5-liter jugs. Bastille also produces and sells roughly 300,000 liters per year of a low-volume, high-cost product called LiteMist. LiteMist is sold in 1-liter bottles. Based on recent data, the CoolDay product has not been as profitable as LiteMist. Management is considering dropping the inexpensive CoolDay line so it can focus more attention on the LiteMist product. The LiteMist product already demands considerably more attention than the CoolDay line.

Frank Summer, president and founder of Bastille, is skeptical about this idea. He points out that for many decades the company produced only the CoolDay line, and that it was always quite profitable. It wasn't until the company started producing the more complicated LiteMist wine that the profitability of CoolDay declined. Prior to the introduction of LiteMist, the company had simple equipment,

Managerial Accounting
Chapter 4

simple growing and production procedures, and virtually no need for quality control. Because LiteMist is bottled in 1-liter bottles, it requires considerably more time and effort, both to bottle and to label and box than does CoolDay. The company must bottle and handle 5 times as many bottles of LiteMist to sell the same quantity as CoolDay. CoolDay requires 1 month of aging; LiteMist requires 1 year. CoolDay requires cleaning and inspection of equipment every 10,000 liters; LiteMist requires such maintenance every 600 liters.

Frank has asked the accounting department to prepare an analysis of the cost per liter using the traditional costing approach and using activity-based costing. The following information was collected.

	CoolDay	LiteMist
Direct materials per liter	\$0.40	\$1.20
Direct labor cost per liter	\$0.25	\$0.50
Direct labor hours per liter	0.04	0.09
Total direct labor hours	120,000	27,000


Activity Cost Pool	Cost Driver	Estimated Overhead	Expected Use of Cost Drivers	Expected Use of Cost Drivers per Product	
				CoolDay	LiteMist
Grape processing	Cart of grapes	\$ 145,200	6,600	6,000	600
Aging	Total months	396,000	6,600,000	3,000,000	3,600,000
Bottling and corking	Number of bottles	270,000	900,000	600,000	300,000
Labeling and boxing	Number of bottles	189,000	900,000	600,000	300,000
Maintain and inspect equipment	Number of inspections	240,000	800	300	500
		\$1,240,200			

Instructions

Answer each of the following questions. (Round all calculations to three decimal places.)

- a. Under traditional product costing using direct labor hours, compute the total manufacturing cost per **liter** of both products.

Managerial Accounting
Chapter 4

- b. Under ABC, prepare a schedule showing the computation of the activity-based overhead rates (per cost driver).
- c. Prepare a schedule assigning each activity's overhead cost pool to each product, based on the use of cost drivers. Include a computation of overhead cost per liter.
- d. Compute the total manufacturing cost per liter for both products under ABC.
- e. 

Write a memo to Frank Summer discussing the implications of your analysis for the company's plans. In this memo provide a brief description of ABC, as well as an explanation of how the traditional approach can result in distortions.

Hint:

Assign overhead costs using traditional costing and ABC; compare results.


(Study Objective 1 Study Objective 4)

P4-5B Les and Moore is a public accounting firm that offers two primary services, auditing and tax return preparation. A controversy has developed between the partners of the two service lines as to who is contributing the greater amount to the bottom line. The area of contention is the assignment of overhead. The tax partners argue for assigning overhead on the basis of 40% of direct labor dollars, while the audit partners argue for implementing activity-based costing. The partners agree to use next year's budgeted data for purposes of analysis and comparison. The following overhead data are collected to develop the comparison.

Activity Cost Pool	Cost Driver	Estimated Overhead	Expected Use of Cost Drivers	Expected Use of Cost Drivers per Service	
				Audit	Tax
Employee training	Direct labor dollars	\$209,000	\$1,900,000	\$1,000,000	\$900,000
Typing and secretarial	Number of reports/forms	76,200	2,500	600	1,900
Computing	Number of minutes	204,000	60,000	25,000	35,000
Facility rental	Number of employees	142,500	38	20	18
Travel	Per expense reports	128,300	Direct	86,800	41,500
		<u>\$760,000</u>			

Instructions

Managerial Accounting
Chapter 4

- a. Using traditional product costing as proposed by the tax partners, compute the total overhead cost assigned to both services (audit and tax) of Les and Moore.
- b.
 1. Using activity-based costing, prepare a schedule showing the computations of the activity-based overhead rates (per cost driver).
 2. Prepare a schedule assigning each activity's overhead cost pool to each service based on the use of the cost drivers.
- c. Classify each of the activities as a value-added activity or a nonvalue-added activity.
- d. 
Comment on the comparative overhead cost per unit for the two products under both traditional costing and ABC.

Hint:

Assign overhead costs to services using traditional costing and ABC; compute overhead rates and unit costs; compare results.

(Study Objective 1 Study Objective 4 Study Objective 6 Study Objective 7)

BROADENING YOUR PERSPECTIVE

GROUP DECISION CASE

BYP4-1 Valley West Hospital is a primary medical health care facility and trauma center that serves 11 small, rural midwestern communities within a 40-mile radius. The hospital offers all the medical/surgical services of a typical small hospital. It has a staff of 18 full-time doctors and 20 part-time visiting specialists. Valley West has a payroll of 150 employees consisting of technicians, nurses, therapists, managers, directors, administrators, dieticians, secretaries, data processors, and janitors.

Instructions

With the class divided into groups, discuss and answer the following.

- a. Using your (limited, moderate, or in-depth) knowledge of a hospital's operations, identify as many **activities** as you can that would serve as the basis for implementing an activity-based costing system.
- b. For each of the activities listed in (a), identify a **cost driver** that would serve as a valid measure of the resources consumed by the activity.

MANAGERIAL ANALYSIS

BYP4-2 Ideal Manufacturing Company of Sycamore, Illinois has supported a research and development (R&D) department that has for many years been the sole contributor

Managerial Accounting
Chapter 4

to the company's new farm machinery products. The R&D activity is an overhead cost center that provides services only to in-house manufacturing departments (4 different product lines), all of which produce agricultural/farm/ranch related machinery products. The department has never sold its services outside, but because of its long history of success, larger manufacturers of agricultural products have approached Ideal to hire its R&D department for special projects. Because the costs of operating the R&D department have been spiraling uncontrollably, Ideal's management is considering entertaining these outside approaches to absorb the increasing costs. But, (1) management doesn't have any cost basis for charging R&D services to outsiders, and (2) it needs to gain control of its R&D costs. Management decides to implement an activity-based costing system in order to determine the charges for both outsiders and the in-house users of the department's services.

R&D activities fall into four pools with the following annual costs.

Market analysis	\$1,050,000
Product design	2,280,000
Product development	3,600,000
Prototype testing	1,400,000

Activity analysis determines that the appropriate cost drivers and their usage for the four activities are:

Activity	Cost Drivers	Total Estimated Drivers
Market analysis	Hours of analysis	15,000 hours
Product design	Number of designs	2,500 designs
Product development	Number of products	90 products
Prototype testing	Number of tests	700 tests

Instructions

- a. Compute the activity-based overhead rate for each activity cost pool.
- b. How much cost would be charged to an in-house manufacturing department that consumed 1,800 hours of market analysis time, was provided 280 designs relating to 10 products, and requested 92 engineering tests?
- c. How much cost would serve as the basis for pricing an R&D bid with an outside company on a contract that would consume 800 hours of analysis time, require 178 designs relating to 3 products, and result in 70 engineering tests?

- d. What is the benefit to Ideal Manufacturing of applying activity-based costing to its R&D activity for both in-house and outside charging purposes?

REAL-WORLD FOCUS

BYP4-3 Hewlett-Packard is considered one of the best managed and most innovative companies in the world. It continually has shown an ability to adapt to global competitive challenges through technical innovation and continual reassessment of its management and control mechanisms. Most applications of activity-based costing by Hewlett-Packard have been successful.

But, over the period August 1988 to August 1989, the Colorado Springs Division of Hewlett-Packard designed an activity-based costing system with the goal of providing for better product costing and inventory valuation. It began implementation in November 1989 but halted the process in the summer of 1992. Since then, the Colorado Springs Division has made no further attempts to re-implement a more expansive ABC approach.

Instructions

The March 1997 issue of *Management Accounting* contains an article by Steven P. Landry, Larry M. Wood, and Tim M. Linqvist about the Colorado Springs Division entitled "Can ABC Bring Mixed Results?" Read the article and answer the following questions.

- a. What went wrong at H-P's Colorado Springs Division in the design, development, and implementation of its activity-based costing system?
- b. What conclusions were drawn from H-P's Colorado Springs Division experience? What does successful ABC implementation require?

EXPLORING THE WEB

BYP4-4 Cost Technology describes itself as a "global consulting company specializing in profit management." The company helps manufacturing, service, and government organizations implement methods, such as activity-based costing and activity-based management, that will improve corporate profitability. The home page of Cost Technology includes information about the company, its markets, and products. The following exercise investigates the company's training programs.

Address: <http://costtechnology.com/training.htm> (or go to www.wiley.com/college/weygandt)

Instructions

This page refers to other pages that describe three different training courses. Read the descriptions of these courses to answer the following questions.

- a. List four types of employees that the company says would benefit from the course "Introduction of Activity-Based Management Solutions."
- b. What is target costing?
- c. What is the major cause of failure of many ABC implementations? Describe "Workforce Activity-Based Management."

COMMUNICATION ACTIVITY

BYP4-5 In our Feature Story about Super Bakery, Inc., we described a virtual corporation as one that consists of a core unit that is supported by a network of outsourced activities. A virtual corporation minimizes investment in human resources, fixed assets, and working capital. The application of ABC to Super Bakery, Inc. is described in an article entitled "ABC in a Virtual Corporation" by Tom Davis and Bruce Darling, in *Management Accounting*, October 1996.

Instructions

Assume you are the controller of a virtual corporation. Using the article as a basis for your communication, write a summary that answers the following questions.

- a. What unique strategies and tactics did Super Bakery's management implement that caused sales to take off and continue to grow at an average rate of 20%?
- b. Why did Super Bakery's management feel that it was necessary to install an ABC system?
- c. What is the main difference between Super Bakery's ABC system and other manufacturers' ABC systems?

RESEARCH ASSIGNMENT

BYP4-6 The April 1998 issue of *Management Accounting* includes an article by Kip R. Krumwiede entitled "ABC: Why It's Tried and How It Succeeds."

Instructions

Read the article and answer the following questions.

- a. What is the adoption and implementation status of ABC according to the survey conducted in 1996 by the Cost Management Group of the Institute of Management Accountants?
- b. What did Krumwiede's survey attempt to determine?
- c. In Krumwiede's survey, what factors appeared to separate those companies that adopted ABC from those that did not adopt ABC?

- d. Identify at least five “Basic ABC Implementation Tips” recommended in the article.

ETHICS CASE

BYP4-7 Ernie Lobb, the cost accountant for Superior Mower Company, recently installed activity-based costing at its St. Louis lawn tractor (riding mower) plant where three models—the 8-horsepower Bladerunner, the 12-horsepower Quickcut, and the 18-horsepower Supercut—are manufactured. Ernie's new product costs for these three models show that the company's traditional costing system had been significantly undercosting the 18-horsepower Supercut. This was due primarily to the lower sales volume of the Supercut compared to the Bladerunner and the Quickcut.

Before completing his analysis and reporting these results to management, Ernie is approached by his friend Eddie Polyester, who is the production manager for the 18-horsepower Supercut model. Eddie has heard from one of Ernie's staff about the new product costs and is upset and worried for his job because the new costs show the Supercut to be losing, rather than making, money.

At first Eddie condemns the new cost system, whereupon Ernie explains the practice of activity-based costing and why it is more accurate than the company's present system. Even more worried now, Eddie begs Ernie, “Massage the figures just enough to save the line from being discontinued. You don't want me to lose my job do you? Anyway, nobody will know.”

Ernie holds firm but agrees to recompute all his calculations for accuracy before submitting his costs to management.

Instructions

- a. Who are the stakeholders in this situation?
- b. What, if any, are the ethical considerations in this situation?
- c. What are Ernie's ethical obligations to the company? To his friend?

GLOSSARY

Activity	Any event, action, transaction, or work sequence that causes a cost to be incurred in producing a product or providing a service. (p. 141)
Activity-based costing (ABC)	An overhead cost allocation system that allocates overhead to multiple activity cost pools and assigns the activity cost pools to products or services by means of cost drivers that represent the activities used. (p. 141)

Activity-based management (ABM)	An extension of ABC from a product costing system to a management function that focuses on reducing costs and improving processes and decision making. (p. 152)
Activity cost pool	The overhead cost allocated to a distinct type of activity or related activities. (p. 142).
Batch-level activities	Activities performed for each batch of products. (p. 162)
Cost driver	Any factor or activity that has a direct cause–effect relationship with the resources consumed. In ABC cost drivers are used to assign activity cost pools to products or services. (p. 141)
Facility-level activities	Activities required to support or sustain an entire production process and not dependent on number of products, batches, or units produced. (p. 163)
Just-in-time (JIT) processing	A processing system dedicated to having the right amount of materials, products, or parts arrive as they are needed, thereby reducing the amount of inventory. (p. 157)
Nonvalue-added activity	An activity that adds cost to, or increases the time spent on, a product or service without increasing its market value. (p. 152)
Product-level activities	Activities performed for and identifiable with an entire product line. (p. 163)
Unit-level activities	Activities performed for each unit of production. (p. 162)
Value-added activity	An activity that increases the worth of a product or service. (p. 152)

Managerial Accounting
Chapter 4