

Activity-based Costing

Chapter 7

AC202 Managerial Accounting

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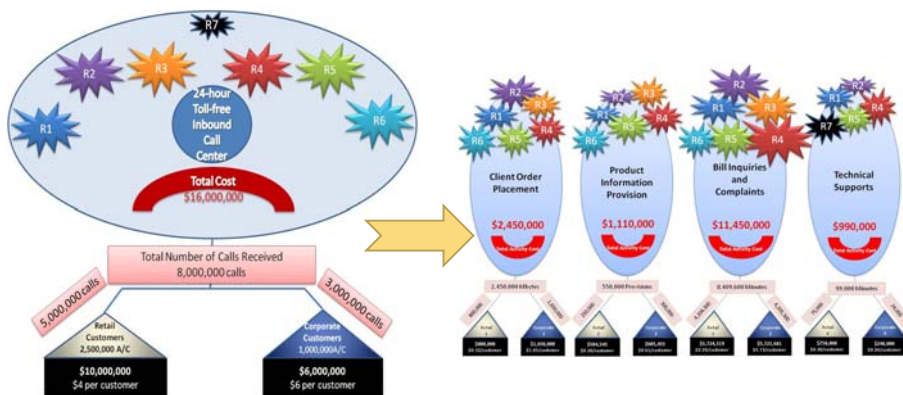
Activity-Based Costing (ABC)

ABC is designed to provide managers with cost information for strategic and other decisions that potentially affect capacity and therefore affect “fixed” as well as variable costs.



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An Brief Overview



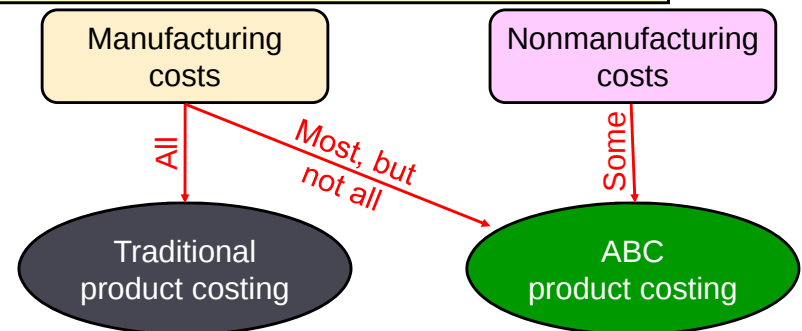
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Objective 1: Understand ABC and how it differs from a traditional costing system.

How Costs are Treated Under Activity-Based Costing

ABC differs from traditional cost accounting in three ways.

① ABC assigns both types of costs to products.

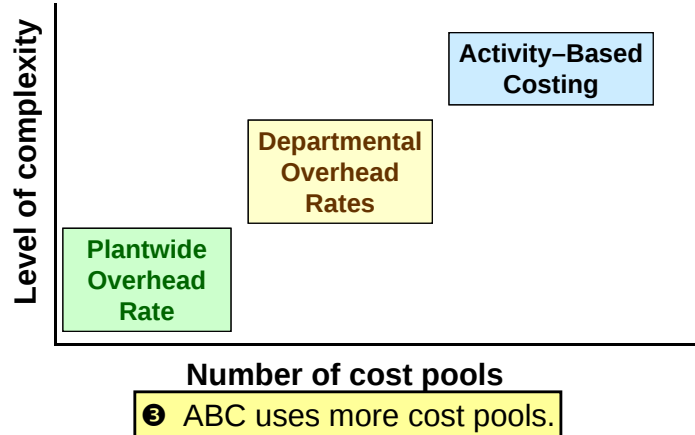


② ABC does not assign all manufacturing costs to products.

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How Costs are Treated Under Activity-Based Costing

ABC differs from traditional cost accounting in three ways.



How Costs are Treated Under Activity-Based Costing

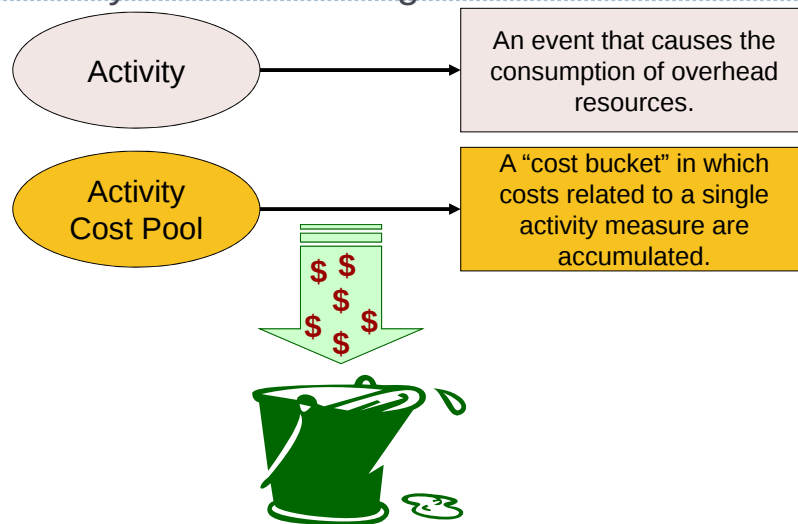
ABC differs from traditional cost accounting in three ways.

Each ABC cost pool has its own unique measure of activity.

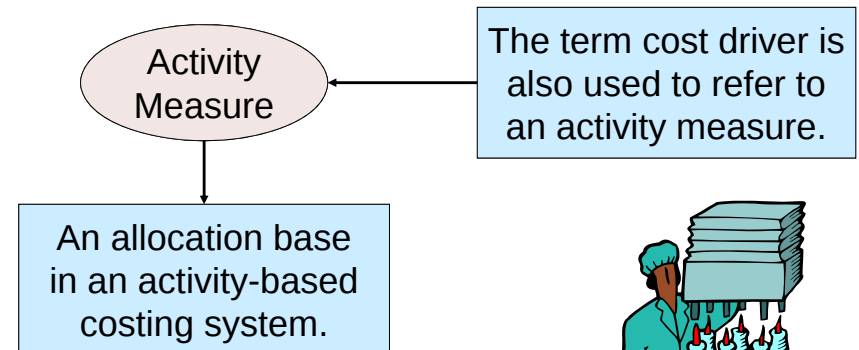
Traditional cost systems usually rely on volume measures such as direct labor hours and/or machine hours to allocate all overhead costs to products.

③ ABC uses more cost pools.

How Costs are Treated Under Activity-Based Costing

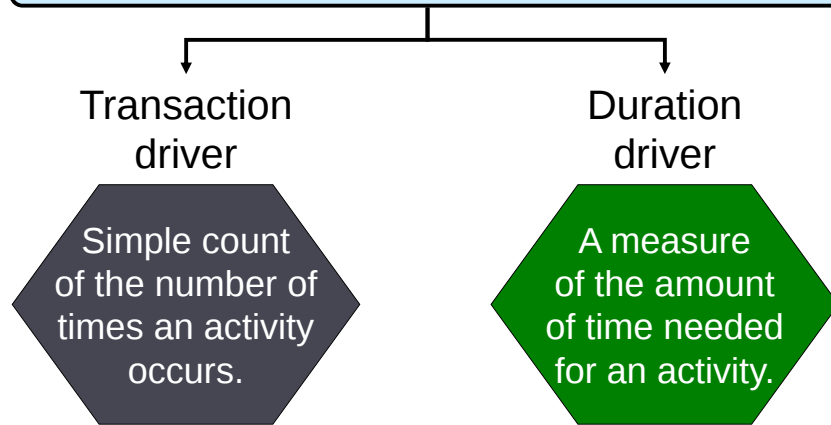


How Costs are Treated Under Activity-Based Costing



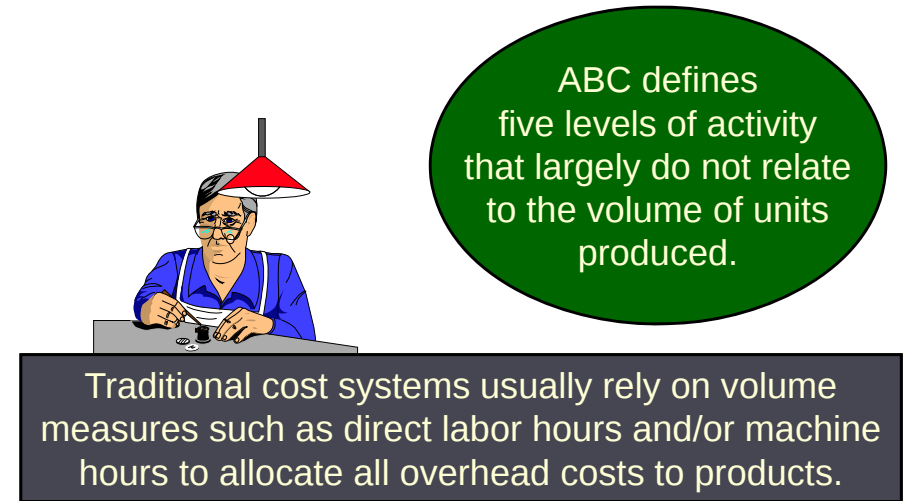
How Costs are Treated Under Activity-Based Costing

Two common types of activity measures:



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How Costs are Treated Under Activity-Based Costing



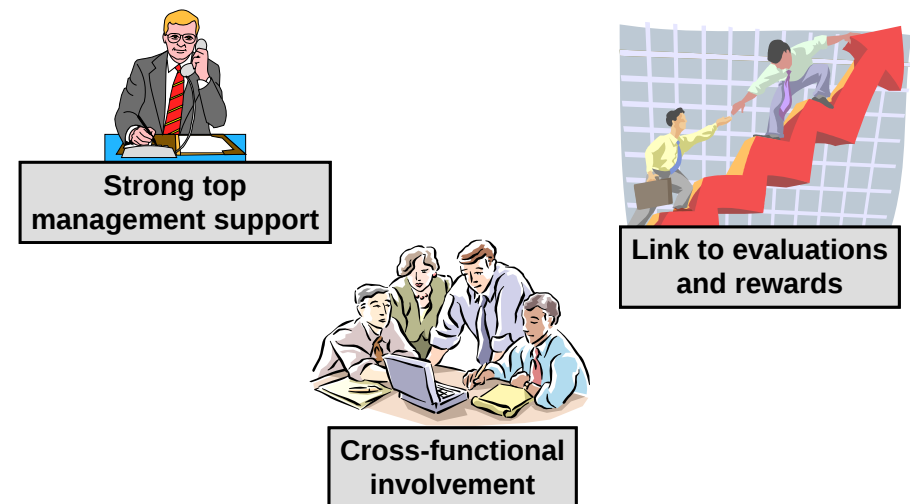
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How Costs are Treated Under Activity-Based Costing



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Characteristics of Successful ABC Implementations



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Baxter Battery – An ABC Example

Baxter Battery Company Income Statement Year Ended December 31, 2013			
Revenue			\$ 50,000,000
Cost of goods sold			
Direct materials	\$15,000,000		
Direct labor	12,000,000		
Manufacturing overhead	14,000,000	41,000,000	
Gross margin		9,000,000	
Selling and administrative expenses			
Shipping expenses	3,000,000		
Marketing expenses	2,000,000		
General administrative expenses	6,000,000	11,000,000	
Net operating loss			\$ (2,000,000)

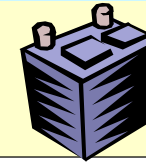
Manufacturing overhead is allocated to products using a single plantwide overhead rate based on machine hours.

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① Define Activities, Activity Cost Pools, and Activity Measures

At Baxter Battery, the ABC team, selected the following activity cost pools and activity measures:

Activity Cost Pools at Baxter Battery	
Activity Cost Pool	Activity Measure
Customer orders	Number of customer orders
Design changes	Number of design changes
Order size	Machine-hours
Customer relations	Number of active customers
Other	Not applicable



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① Define Activities, Activity Cost Pools, and Activity Measures

- ▶ **Customer Orders** - assigned all costs of resources that are consumed by taking and processing customer orders.
- ▶ **Design Changes** - assigned all costs of resources consumed by customer requested design changes.
- ▶ **Order Size** - assigned all costs of resources consumed as a consequence of the number of units produced.
- ▶ **Customer Relations** – assigned all costs associated with maintaining relations with customers.
- ▶ **Other** – assigned all organization-sustaining costs and unused capacity costs

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② Assign Overhead Costs to Activity Cost Pools

Overhead Costs at Baxter Battery (Manufacturing and Nonmanufacturing)			
Production Department			
Indirect factory wages	\$ 6,000,000		
Factory equipment depreciation	3,500,000		
Factory utilities	2,500,000		
Factory building lease	2,000,000	\$ 14,000,000	
General Administrative Department			
Administrative wages and salaries	4,000,000		
Office equipment depreciation	900,000		
Administrative building lease	1,100,000	6,000,000	
Marketing Department			
Marketing wages and salaries	1,500,000		
Selling expenses	500,000	2,000,000	
Total overhead costs			\$ 22,000,000

▶ Objective 2: Assign costs to cost pools using a first-stage allocation.

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② Assign Overhead Costs to Activity Cost Pools

Overhead Costs at Baxter Battery (Manufacturing and Nonmanufacturing)		
Production Department		
Indirect factory wages	\$ 6,000,000	
Factory equipment depreciation	3,500,000	
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General Administrative Department		
Administrative wages and salaries	4,000,000	
Office equipment depreciation	900,000	
Administrative building lease	1,100,000	6,000,000
Marketing Department		
Direct materials, direct labor, and shipping are excluded because Baxter Battery's existing cost system can directly trace these costs to products or customer orders.		
Objective 2: Assign costs to cost pools using a first-stage allocation.		

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② Assign Overhead Costs to Activity Cost Pools

At Baxter Battery the following distribution of resource consumption across activity cost pools is determined.

Activity Cost Pools						
	Customer Orders	Design Changes	Order Size	Customer Relations	Other	Total
Production Department						
Indirect factory wages	30%	30%	20%	10%	10%	100%
Factory equipment depreciation	20%	10%	60%	0%	10%	100%
Factory utilities	0%	10%	60%	0%	30%	100%
Factory building lease	0%	0%	0%	0%	100%	100%
General Administrative Department						
Administrative wages and salaries	30%	10%	10%	30%	20%	100%
Office equipment depreciation	30%	10%	0%	20%	40%	100%
Administrative building lease	0%	0%	0%	0%	100%	100%
Marketing Department						
Marketing wages and salaries	30%	10%	0%	50%	10%	100%
Selling expenses	20%	0%	0%	70%	10%	100%

▶ Objective 2: Assign costs to cost pools using a first-stage allocation.

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② Assign Overhead Costs to Activity Cost Pools

Overhead Costs at Baxter Battery (Manufacturing and Nonmanufacturing)		
Production Department		
Indirect factory wages	\$ 6,000,000	
Factory equipment depreciation	3,500,000	
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General Administrative Department		
Administrative wages and salaries	4,000,000	
Office equipment depreciation	900,000	
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Marketing Department		
Marketing wages and salaries	1,500,000	
Selling expenses	500,000	2,000,000
Total overhead costs		\$ 22,000,000

Customer Orders		
Production Department		
Indirect factory wages	\$ 1,800,000	
Factory equipment depreciation		
Factory utilities		
Factory building lease		
General Administrative Department		
Administrative wages and salaries		
Office equipment depreciation		
Administrative building lease		
Marketing Department		
Marketing wages and salaries		
Selling expenses		
Total		

Indirect factory wages	\$6,000,000
Percent consumed by customer orders	30%
	\$1,800,000

▶ Objective 2: Assign costs to cost pools using a first-stage allocation.

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② Assign Overhead Costs to Activity Cost Pools

Overhead Costs at Baxter Battery (Manufacturing and Nonmanufacturing)		
Production Department		
Indirect factory wages	\$ 6,000,000	
Factory equipment depreciation	3,500,000	
Factory utilities	2,500,000	
Factory building lease	2,000,000	\$ 14,000,000
General Administrative Department		
Administrative wages and salaries	4,000,000	
Office equipment depreciation	900,000	
Administrative building lease	1,100,000	6,000,000
Marketing Department		
Marketing wages and salaries	1,500,000	
Selling expenses	500,000	2,000,000
Total overhead costs		\$ 22,000,000

Customer Orders		
Production Department		
Indirect factory wages	\$ 1,800,000	
Factory equipment depreciation	700,000	
Factory utilities		
Factory building lease		
General Administrative Department		
Administrative wages and salaries		
Office equipment depreciation		
Administrative building lease		
Marketing Department		
Marketing wages and salaries		
Selling expenses		
Total		

Factory equipment depreciation	\$3,500,000
Percent consumed by customer orders	20%
	\$ 700,000

▶ Objective 2: Assign costs to cost pools using a first-stage allocation.

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② Assign Overhead Costs to Activity Cost Pools

	Activity Cost Pools					Total
	Customer Orders	Design changes	Order Size	Customer Relations	Other	
Production Department						
Indirect factory wages	\$ 1,800,000	\$ 1,800,000	\$ 1,200,000	\$ 600,000	\$ 600,000	\$ 6,000,000
Factory equipment depreciation	700,000	350,000	2,100,000	-	350,000	3,500,000
Factory utilities	-	250,000	1,500,000	-	750,000	2,500,000
Factory building lease	-	-	-	-	2,000,000	2,000,000
General Administrative Department						
Administrative wages and salaries	1,200,000	400,000	400,000	1,200,000	800,000	4,000,000
Office equipment depreciation	270,000	90,000	-	180,000	360,000	900,000
Administrative building lease	-	-	-	-	1,100,000	1,100,000
Marketing Department						
Marketing wages and salaries	450,000	150,000	-	750,000	150,000	1,500,000
Selling expenses	100,000	-	-	350,000	50,000	500,000
Total	\$ 4,520,000	\$ 3,040,000	\$ 5,200,000	\$ 3,080,000	\$ 6,160,000	\$ 22,000,000

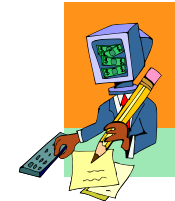
► Objective 2: Assign costs to cost pools using a first-stage allocation.

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③ Calculate Activity Rates

The ABC team determines that Baxter Battery will have these total activities for each activity cost pool . . .

- 10,000 customer orders,
- 4,000 design changes,
- 800,000 machine-hours,
- 2,000 customers served.



Now the team can compute the individual activity rates by dividing the total cost for each activity by the total activity levels.

► Objective 3: Compute activity rates for cost pools.

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③ Calculate Activity Rates

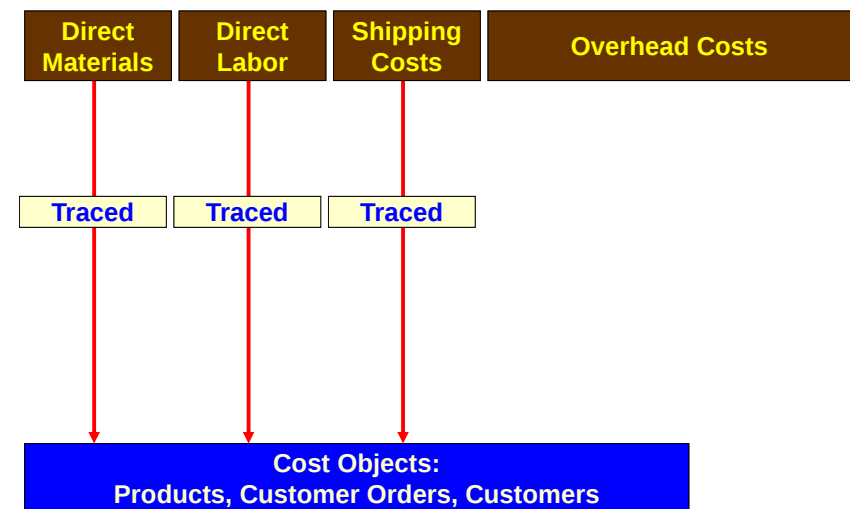
Computation of Activity Rates			
Activity Cost Pools	(a) Total Cost	(b) Total Activity	(a) ÷ (b) Activity Rate
Customer orders	\$ 4,520,000	10,000 orders	\$452 per order
Design changes	3,040,000	4,000 changes	\$760 per change
Order size	5,200,000	800,000 MHs	\$6.50 per MH
Customer relations	3,080,000	2,000 customers	\$1,540 per customer
Other	6,160,000	Not applicable	Not applicable
Total	\$ 22,000,000		



► Objective 3: Compute activity rates for cost pools.

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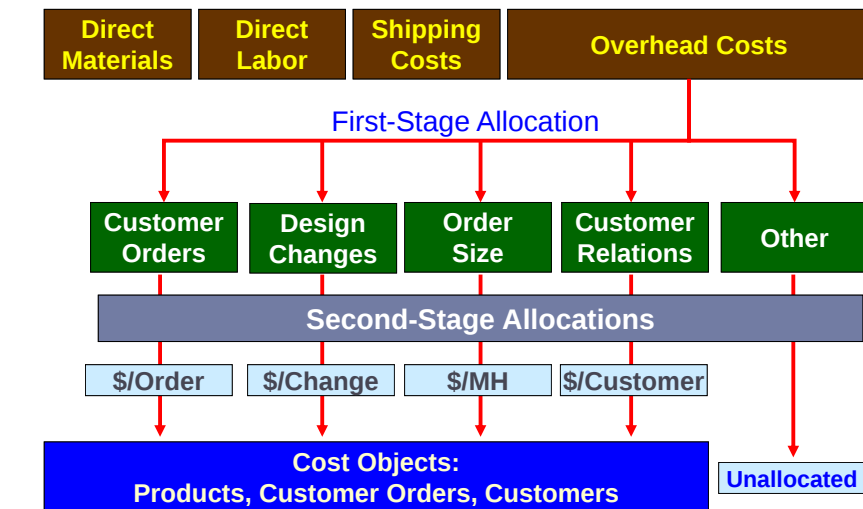
Activity-Based Costing at Baxter Battery



► Objective 3: Compute activity rates for cost pools.

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Activity-Based Costing at Baxter Battery



► Objective 3: Compute activity rates for cost pools.

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④ Assigning Overhead to Products

Baxter Battery Information

SureStart

1. Requires no new design resources.
2. 800,000 batteries ordered with 4,000 separate orders.
3. Each SureStart requires 36 minutes of machine time for a total of 480,000 machine-hours.

LongLife

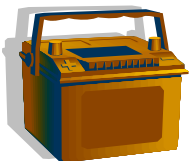
1. Requires new design resources.
2. 400,000 batteries ordered with 6,000 separate orders.
3. 4,000 custom designs prepared.
4. Each LongLife requires 48 minutes of machine time for a total of 320,000 machine-hours.

► Objective 4: Assign costs to a cost object using a second-stage allocation .

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④ Assigning Overhead to Products

Overhead Cost for the SureStart			
Activity Cost Pools	(a) Activity Rate	(b) Activity	(a) × (b) ABC Cost
Customer orders	\$ 452.00	4,000	\$ 1,808,000
Design changes	760.00	-	-
Order size	6.50	480,000	3,120,000
Total			\$ 4,928,000



Overhead Cost for the LongLife			
Activity Cost Pools	(a) Activity Rate	(b) Activity	(a) × (b) ABC Cost
Customer orders	\$ 452.00	6,000	\$ 2,712,000
Design changes	760.00	4,000	3,040,000
Order size	6.50	320,000	2,080,000
Total			\$ 7,832,000

► Objective 4: Assign costs to a cost object using a second-stage allocation .

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Assigning Overhead to Customers

Let's take a look at how Baxter Battery's system works for just one of the 2,000 customers – Acme Auto Parts who placed a total of twelve orders. Note that the four orders for LongLifes required a design change.

Orders

1. Eight orders for 60 SureStarts per order.
2. Four orders for 50 LongLifes per order.

Machine-hours

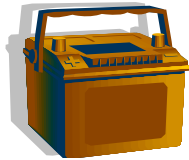
1. The 480 SureStarts required 288 machine-hours.
2. The 200 LongLifes required 160 machine-hours.

► Objective 4: Assign costs to a cost object using a second-stage allocation .

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Assigning Overhead to Customers

Overhead Cost for Acme Auto Parts			
Activity Cost Pools	(a) Activity Rate	(b) Activity	(a) × (b) ABC Cost
Customer orders	\$ 452.00	12	\$ 5,424
Design changes	760.00	4	3,040
Order size	6.50	448	2,912
Customer relations	1,540.00	1	1,540
Total			<u>\$ 12,916</u>



Objective 4: Assign costs to a cost object using a second-stage allocation .

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5 Prepare Management Reports

Product Margin Calculations

The first step in computing product margins is to gather each product's sales and direct cost data.

	SureStarts	LongLives	Total
Sales	\$ 31,300,000	\$ 18,700,000	\$ 50,000,000
Direct costs			
Direct material	9,000,000	6,000,000	15,000,000
Direct labor	7,000,000	5,000,000	12,000,000
Shipping	2,000,000	1,000,000	3,000,000



Objective 5: Use ABC to compute product and customer margins.

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5 Prepare Management Reports

Product Margin Calculations

The second step in computing product margins is to incorporate the previously computed activity-based cost assignments pertaining to each product.

	SureStarts	LongLives	Total
Sales	\$ 31,300,000	\$ 18,700,000	\$ 50,000,000
Direct costs			
Direct material	9,000,000	6,000,000	15,000,000
Direct labor	7,000,000	5,000,000	12,000,000
Shipping	2,000,000	1,000,000	3,000,000
ABC cost assignments			
Customer orders	1,808,000	2,712,000	4,520,000
Design changes		3,040,000	3,040,000
Order size	3,120,000	2,080,000	5,200,000

Objective 5: Use ABC to compute product and customer margins.

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5 Prepare Management Reports

Product Margin Calculations

The third step in computing product margins is to deduct each product's direct and indirect costs from sales.

	SureStarts	LongLives
Sales	\$ 31,300,000	\$ 18,700,000
Costs		
Direct material	\$ 9,000,000	\$ 6,000,000
Direct labor	7,000,000	5,000,000
Shipping	2,000,000	1,000,000
Customer orders	1,808,000	2,712,000
Design changes		3,040,000
Order size	3,120,000	2,080,000
Total cost	22,928,000	19,832,000
Product margin	<u>\$ 8,372,000</u>	<u>\$ (1,132,000)</u>

Objective 5: Use ABC to compute product and customer margins.

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5 Prepare Management Reports

Product Margin Calculations

The product margins can be reconciled with the company's net operating loss as follows:

	SureStarts	LongLifes	Total
Sales	\$ 31,300,000	\$ 18,700,000	\$ 50,000,000
Total costs	22,928,000	19,832,000	42,760,000
Product margins	<u>\$ 8,372,000</u>	<u>\$ (1,132,000)</u>	<u>\$ 7,240,000</u>
Less costs not assigned to products:			
Customer relations			3,080,000
Other			6,160,000
Total			<u>9,240,000</u>
Net operating loss			<u>\$ (2,000,000)</u>

► Objective 5: Use ABC to compute product and customer margins.

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5 Prepare Management Reports

Customer Margin (Profitability) Analysis

The first step in computing Acme Auto Parts' customer margin is to gather its sales and direct cost data.

	Acme Auto Parts
Sales	<u>\$ 29,200</u>
Direct costs	
Direct material	7,500
Direct labor	6,700
Shipping	1,700

► Objective 5: Use ABC to compute product and customer margins.

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5 Prepare Management Reports

Customer Margin (Profitability) Analysis

The second step is to incorporate Acme Auto Parts' previously computed activity-based cost assignments.

	Acme Auto Parts
Sales	<u>\$ 29,200</u>
Direct costs	
Direct material	7,500
Direct labor	6,700
Shipping	1,700
ABC cost assignments	
Customer orders	5,424
Product design	3,040
Order size	2,912
Customer relations	1,540

► Objective 5: Use ABC to compute product and customer margins.

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5 Prepare Management Reports

Customer Margin (Profitability) Analysis

The third step is to compute Acme Auto Parts' customer margin of \$384 by deducting all its direct and indirect costs from its sales.

	Acme Auto Parts
Sales	<u>\$ 29,200</u>
Direct costs	
Direct material	\$ 7,500
Direct labor	6,700
Shipping	1,700
Customer orders	5,424
Product design	3,040
Order size	2,912
Customer relations	<u>1,540</u>
Customer margin	<u><u>\$ 384</u></u>

► Objective 5: Use ABC to compute product and customer margins.

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Product Margins Computed Using the Traditional Cost System

The first step in computing product margins is to gather each product's sales and direct cost data.

	SureStarts	LongLifes	Total
Sales	\$ 31,300,000	\$ 18,700,000	\$ 50,000,000
Direct costs			
Direct material	9,000,000	6,000,000	15,000,000
Direct labor	7,000,000	5,000,000	12,000,000



Objective 6: Comparison of traditional and ABC product costs.

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Product Margins Computed Using the Traditional Cost System

The second step in computing product margins is to compute the plantwide overhead rate.

Manufacturing Overhead Costs at Baxter Battery	
Production Department	
Indirect factory wages	\$ 6,000,000
Factory equipment depreciation	3,500,000
Factory utilities	2,500,000
Factory building lease	2,000,000
Total manufacturing overhead	<u>\$ 14,000,000</u>

$$\text{Plantwide manufacturing overhead rate} = \frac{\$14,000,000}{800,000 \text{ MH}} = \$17.50 \text{ per machine-hour}$$

	Machine-hours
SureStarts (800,000 @ 0.60 hours)	480,000
LongLifes (400,000 @ 0.80 hours)	320,000
Total machine-hours	<u>800,000</u>

Objective 6: Comparison of traditional and ABC product costs.

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Product Margins Computed Using the Traditional Cost System

The third step in computing product margins is to allocate manufacturing overhead to each product.

	Machine Hours	Overhead Rate	Overhead Allocated
SureStarts	480,000	\$ 17.50	\$ 8,400,000
LongLifes	320,000	17.50	5,600,000
Total overhead allocated to products			<u>\$ 14,000,000</u>

$$480,000 \text{ hours} \times \$17.50 \text{ per hour} = \$8,400,000$$



Objective 6: Comparison of traditional and ABC product costs.

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Product Margins Computed Using the Traditional Cost System

The fourth step is to actually compute the product margins.

	SureStarts	LongLifes	Total
Sales	\$ 31,300,000	\$ 18,700,000	\$ 50,000,000
Cost of goods sold			
Direct materials	\$ 9,000,000	\$ 6,000,000	\$ 15,000,000
Direct labor	7,000,000	5,000,000	12,000,000
Manufacturing overhead	8,400,000	5,600,000	14,000,000
Product margin	<u>\$ 6,900,000</u>	<u>2,100,000</u>	<u>9,000,000</u>
Selling and administrative			11,000,000
Net operating loss			<u>\$ (2,000,000)</u>

Shipping expenses	\$ 3,000,000
Marketing expenses	2,000,000
General administrative expenses	6,000,000
	<u>\$ 11,000,000</u>

Objective 6: Comparison of traditional and ABC product costs.

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Differences Between ABC and Traditional Product Costs

	SureStarts	LongLifes
Product margins – traditional	\$ 6,900,000	\$ 2,100,000
Product margins – ABC	8,372,000	(1,132,000)
Change in reported margins	\$ 1,472,000	\$ (3,232,000)

The traditional cost system **overcosts** the SureStarts and reports a **lower** product margin for this product.

The traditional cost system **undercosts** the LongLifes and reports a **higher** product margin for this product.

Objective 6: Comparison of traditional and ABC product costs.

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Differences Between ABC and Traditional Product Costs

There are three reasons why the reported product margins for the two costing systems differ from one another.

- 1 Traditional costing allocates all manufacturing overhead to products. ABC costing only assigns manufacturing overhead costs consumed by products to those products.

Objective 6: Comparison of traditional and ABC product costs.

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Differences Between ABC and Traditional Product Costs

- 2 Traditional costing allocates all manufacturing overhead costs using a volume-related allocation base. ABC costing also uses non-volume related allocation bases.

- 3 Traditional costing disregards selling and administrative expenses because they are assumed to be period expenses. ABC costing directly traces shipping costs to products and includes nonmanufacturing overhead costs caused by products in the activity cost pools that are assigned to products.

Activity-based Costing and Customer Profitability Analysis



- Analyze profitability of different customer groups
e.g. retail customers vs corporate customers
- Examine different activities by resource consumption and relevant cost drivers
- Sum up the allocated costs in each activity based on customer group
- Other factors to consider:
 - Growth potential
 - Customer loyalty and industry's barrier of entry
 - Customer lifetime value

Objective 6: Comparison of traditional and ABC product costs.

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Activity-based Management: Targeting Process Improvement

Activity-based management is used in conjunction with ABC to identify areas that would benefit from process improvements.



Activity-based process analysis and its costing data provide valuable clues on where to focus improvement efforts. Non-value added processes can be improved or eliminated, reducing spending on non-value added costs.

Benchmarking can be used to compare activity cost information with world-class standards of performance achieved by other organizations.

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Activity-Based Costing and External Reporting

Most companies do not use ABC for external reporting because . . .

1. External reports are less detailed than internal reports.
2. It may be difficult to make changes to the company's accounting system.
3. ABC does not conform to GAAP.
4. Auditors may be suspect of the subjective allocation process based on interviews with employees.

► Objective 6: Comparison of traditional and ABC product costs.

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ABC Limitations

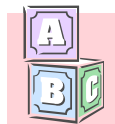
Substantial resources required to implement and maintain.

Resistance to unfamiliar numbers and reports.

Desire to fully allocate all costs to products.

Potential misinterpretation of unfamiliar numbers.

Does not conform to GAAP. Two costing systems may be needed.



► Objective 6: Comparison of traditional and ABC product costs.

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End of Chapter 7



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