

# Activity-Based Costing: A Tool to Aid Decision Making

## Chapter 7

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## Activity-Based Costing (ABC)

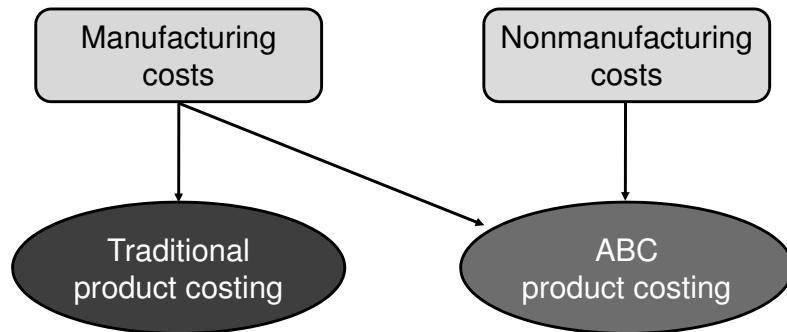
ABC is designed to provide managers with cost information for strategic and other decisions that potentially affect capacity, and therefore, affect “fixed” as well as variable costs.



Objective 1: Understand activity-based costing 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.

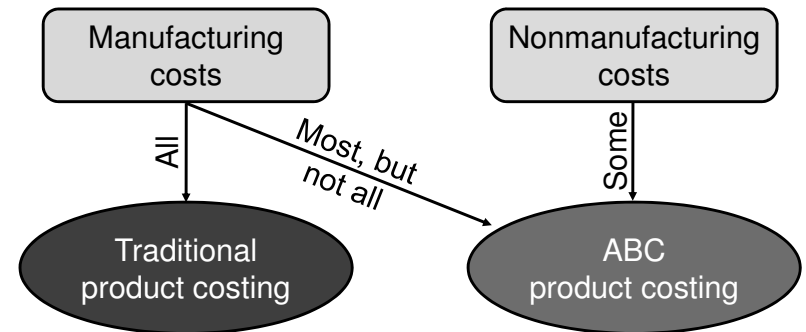


1 ABC assigns both types of costs to products.

Objective 1: Understand activity-based costing and how it differs from a traditional costing system.

## How Costs are Treated Under Activity-Based Costing

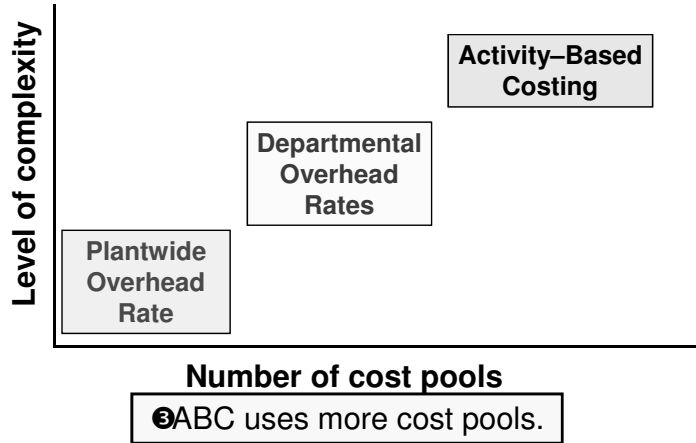
ABC differs from traditional cost accounting in three ways.



2 ABC does not assign all manufacturing costs to products.

# 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

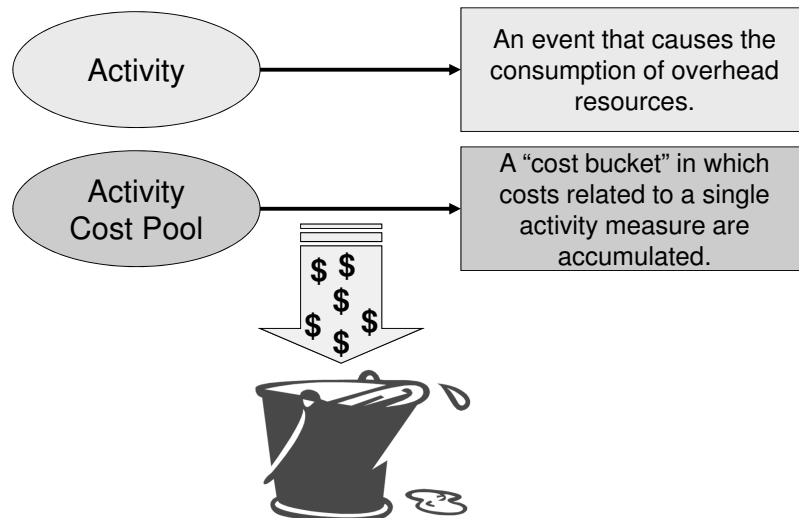
ABC differs from traditional cost accounting in three ways.

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

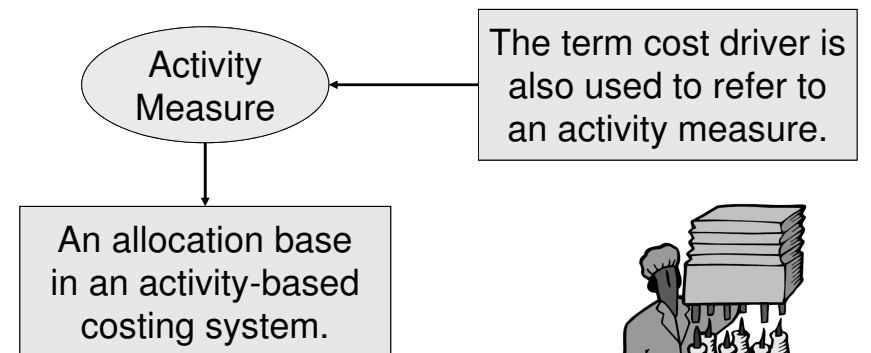
Traditional cost systems usually rely on volume measures such as direct labor hours and/or machine hours to allocate all overhead costs to products.

ABC uses more cost pools.

# How Costs are Treated Under Activity-Based Costing

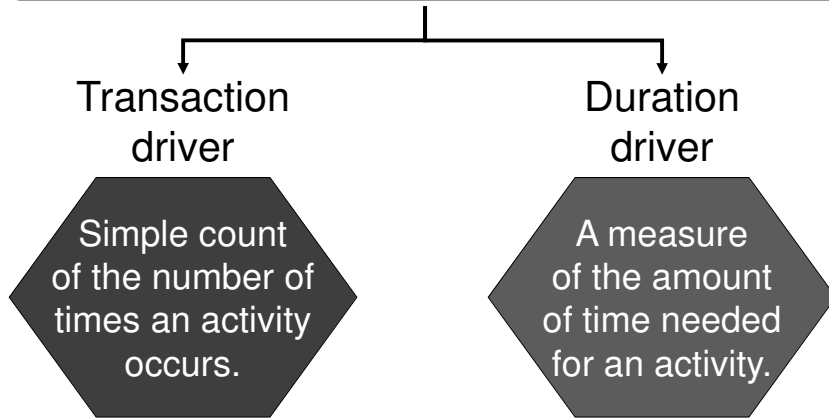


# How Costs are Treated Under Activity-Based Costing



# How Costs are Treated Under Activity-Based Costing

Two common types of activity measures:



# How Costs are Treated Under Activity-Based Costing

ABC defines five levels of activity that largely do not relate to the volume of units produced.



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

# How Costs are Treated Under Activity-Based Costing



# Characteristics of Successful ABC Implementations



Strong top management support



Link to evaluations and rewards



Cross-functional involvement

## Baxter Battery - An ABC Example

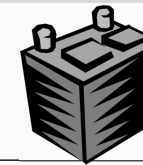
Baxter Battery Company Income Statement Year Ended December 31, 2012			
Sales			\$ 50,000,000
Cost of goods sold			
Direct materials	\$ 15,000,000		
Direct labor	12,000,000		
Manufacturing overhead	14,000,000	41,000,000	
Gross margin			9,000,000
Selling and administrative expenses			
Shipping expenses	3,000,000		
Marketing expenses	2,000,000		
General administrative expenses	6,000,000	11,000,000	
Net operating loss			<u>\$ (2,000,000)</u>

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

## 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



## 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

## ② Assign Overhead Costs to Activity Cost Pools

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.

Overhead Costs at Baxter Battery (Manufacturing and Nonmanufacturing)			
<b>Production Department</b>			
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	
<b>General Administrative Department</b>			
Administrative wages and salaries	4,000,000		
Office equipment depreciation	900,000		
Administrative building lease	1,100,000	6,000,000	
<b>Marketing Department</b>			
Marketing wages and salaries	1,500,000		
Selling expenses	500,000	2,000,000	
Total overhead costs			<u>\$ 22,000,000</u>

## 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
<b>Production Department</b>						
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%
<b>General Administrative Department</b>						
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%
<b>Marketing Department</b>						
Marketing wages and salaries	30%	10%	0%	50%	10%	100%
Selling expenses	20%	0%	0%	70%	10%	100%

## ② Assign Overhead Costs to Activity Cost Pools

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

	Activity Cost Pools					Total
	Customer Orders	Design changes	Order Size	Customer Relations	Other	
<b>Production Department</b>						
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
<b>General Administrative Department</b>						
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
<b>Marketing Department</b>						
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
<b>Total</b>	<b>\$ 4,520,000</b>	<b>\$ 3,040,000</b>	<b>\$ 5,200,000</b>	<b>\$ 3,080,000</b>	<b>\$ 6,160,000</b>	<b>\$ 22,000,000</b>

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

## 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.



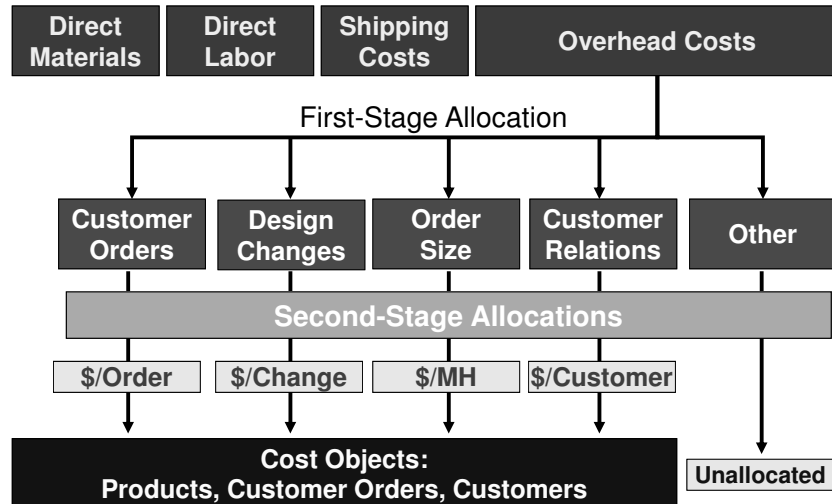
Now the team can compute the individual activity rates by dividing the total cost for each activity by the total activity levels.

## ③ Calculate Activity Rates

Activity Cost Pools	Computation of Activity Rates		
	(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
<b>Total</b>	<b>\$ 22,000,000</b>		



## Activity-Based Costing at Baxter Battery



## 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.

## 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
<b>Total</b>			<b>\$ 4,928,000</b>

### 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
<b>Total</b>			<b>\$ 7,832,000</b>



## 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.

## Assigning Overhead to Customers

### Overhead Cost for Acme Auto Parts

<i>Activity Cost Pools</i>	(a) <i>Activity Rate</i>	(b) <i>Activity</i>	(a) × (b) <i>ABC Cost</i>
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
<b>Total</b>			<b>\$ 12,916</b>



## 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



## 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

## 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>

## 5 Prepare Management Reports

### Product Margin Calculations

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

	SureStarts	LongLives	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>	\$ 7,240,000
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>

## 5 Prepare Management Reports

### Customer Margin 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

## 5 Prepare Management Reports

### Customer Margin Analysis

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

	Acme Auto Parts
Sales	\$ 29,200
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

## 5 Prepare Management Reports

### Customer Margin 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	\$ 29,200
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>\$ 384</u>

## 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	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



## 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
<b>Total manufacturing overhead</b>	<b>\$ 14,000,000</b>

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

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

## Product Margins Computed Using the Traditional Cost System

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

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

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



## Product Margins Computed Using the Traditional Cost System

The fourth step is to actually compute the product margins.

	SureStarts	LongLives	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	\$ 6,900,000	2,100,000	9,000,000
Selling and administrative			11,000,000
Net operating loss			\$ (2,000,000)

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

## Differences Between ABC and Traditional Product Costs

	<u>SureStarts</u>	<u>LongLifes</u>
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.

## 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.

## 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.

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

## 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.

- 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.

## Targeting Process Improvement

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



While the theory of constraints approach discussed in Chapter 1 is a powerful tool for targeting improvement efforts, activity rates can also provide valuable clues on where to focus improvement efforts.

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

## 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.

## 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.

