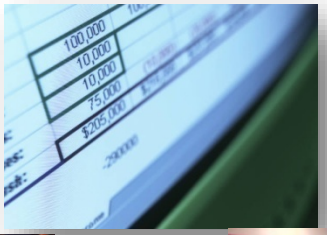
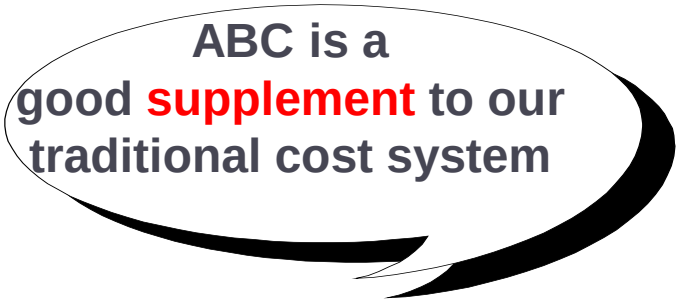


Activity-Based Costing: A Tool to Aid Decision Making

Chapter 7

Activity–Based Costing (ABC)

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



Keynote:
ABC costing & other costing methods:

For manufacturing companies, all costing methods are about the allocation of OVERHEAD costs (manufacturing or non-manufacturing). It is NOT about adding DM or DL to product cost since DM and DL can be easily traced to the final products.

These costing methods are also applicable to non-manufacturing companies.

DM: direct materials;
DL: direct labor;
Non-manufacturing overhead: such as marketing expenses.

Activity–Based Costing (ABC)

Think about a call center which serves both retail customers and corporate customers.

How are the call center's costs allocated between the two groups of customers?

Option #1:
The number of customers

→ Traditional costing methods

Option #2:
The number of calls made by customers

→ Traditional costing methods

Option #1 is less sophisticated than Option#2

Activity–Based Costing (ABC)

Still, Option#2 treats every call equally but ignores:

The most expensive resources that build up the call centers

How were these resources consumed

Which was the group of customers consuming most of the expensive resources

In sum:
Option #2 is not based on the internal activities of call centers and it is based on the externally-observed activities. It is important to conduct the cost breakdown analysis.

Activity–Based Costing (ABC)

The breakdown of call center **costs:**

First, we identify the resources ("R") of the call center.

R1: Managers/supervisors
R2: Computer system

R3: Inquiry agents
R4: Telephone expenses

R5: Office rental
R6: Relationship office

Q: how many of these resources can be observed by external investors?

Activity–Based Costing (ABC)

The breakdown of call center **activities ("A")**

All activities: both internal activities and externally-perceived activities

A1: Client order placement
A2: Product information provision

A3: Bill inquiries and complaints
A4: Technical supports

Each activity ("A") consumes different amount of each resources ("R"). We accumulate these resources used for each "A". That is, we allocate total resources to different "A"s. "A" is now cost driver.

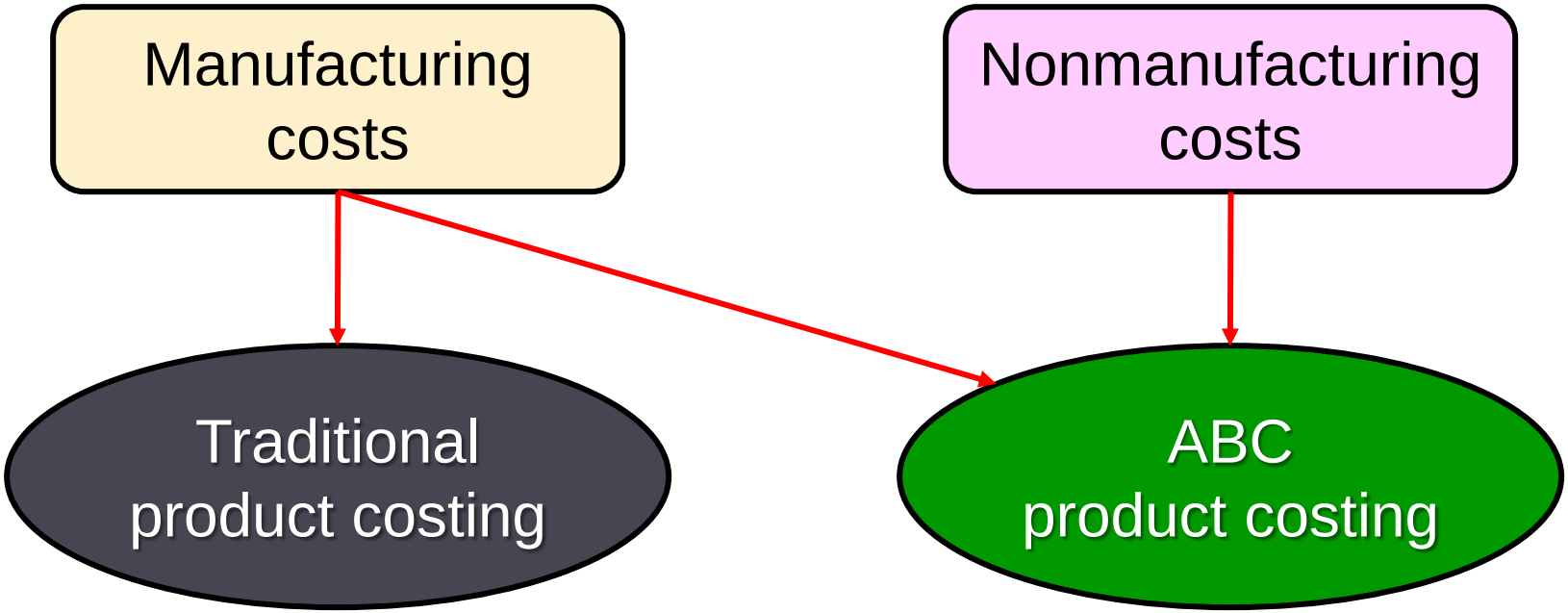
Each group of customers require different amount of services ("A"s). We first accumulate the total frequency of each activity (each "A").

Calculate unit price for each "A" activity. Then we can use the required amount of service for each group to get the cost per activity for that group.

ABC differs from traditional cost accounting in three ways.

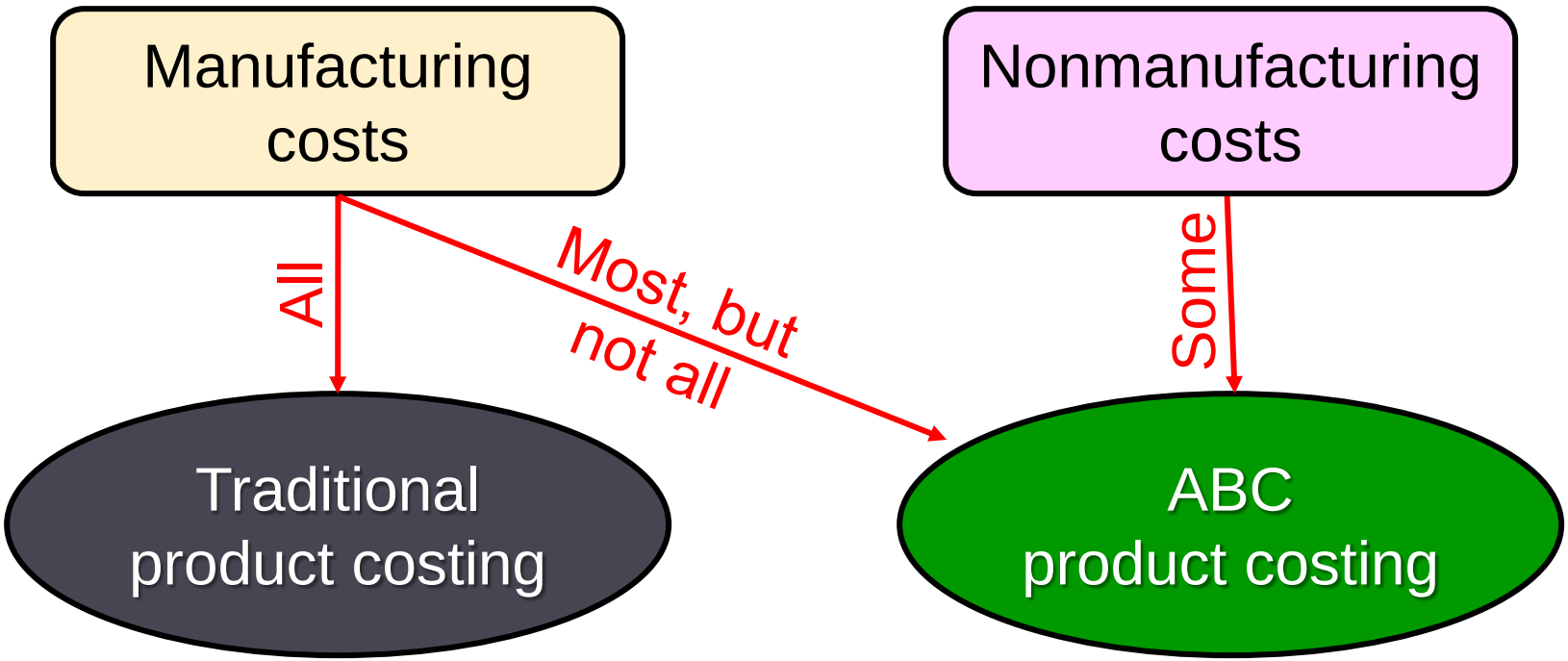
ABC systems can assign sales commissions, shipping costs, and warranty repair costs to specific products.

In light of this feature, ABC costing method is **NOT accepted** by the external financial reporting standards (GAAP). Companies cannot use ABC to prepare annual reports.



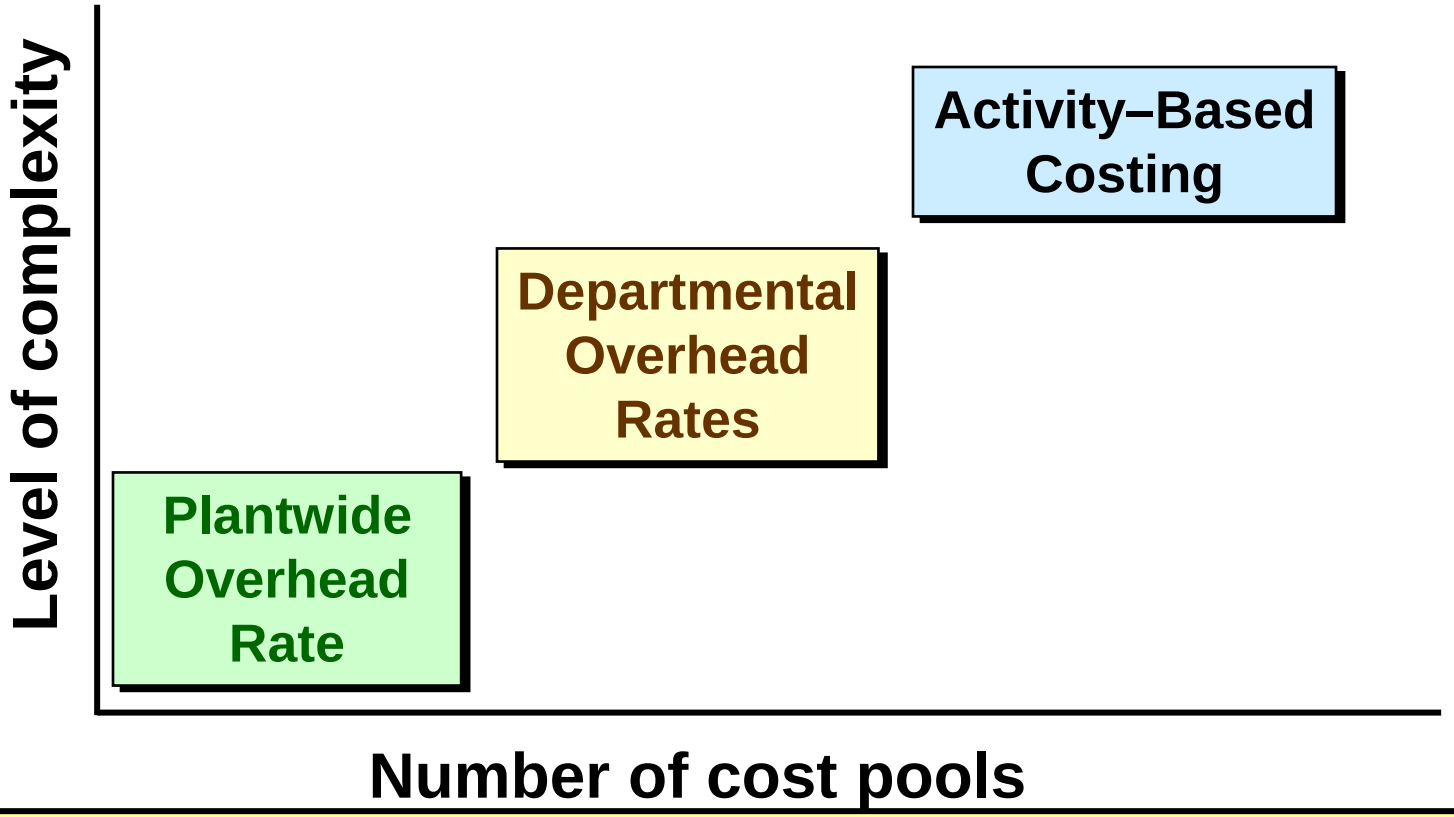
❶ ABC assigns both types of costs (non-manufacturing and manufacturing costs) to products, but only on the cause-and-effect basis.

ABC differs from traditional cost accounting in three ways.



❷ ABC does not assign all manufacturing costs to products.
Some manufacturing costs may be excluded from product costs

ABC differs from traditional cost accounting in three ways.



❸ ABC uses more cost pools.

Each cost pool is allocated to either products or other cost objects

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.

❸ ABC uses more cost pools.

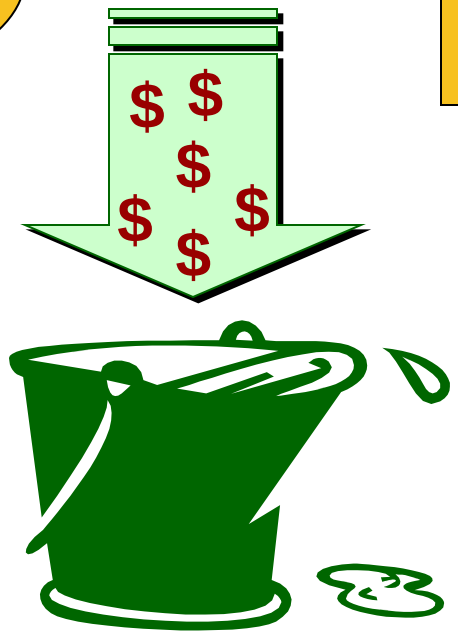
Activity–Based Costing

Activity

An event that causes the consumption of overhead resources.

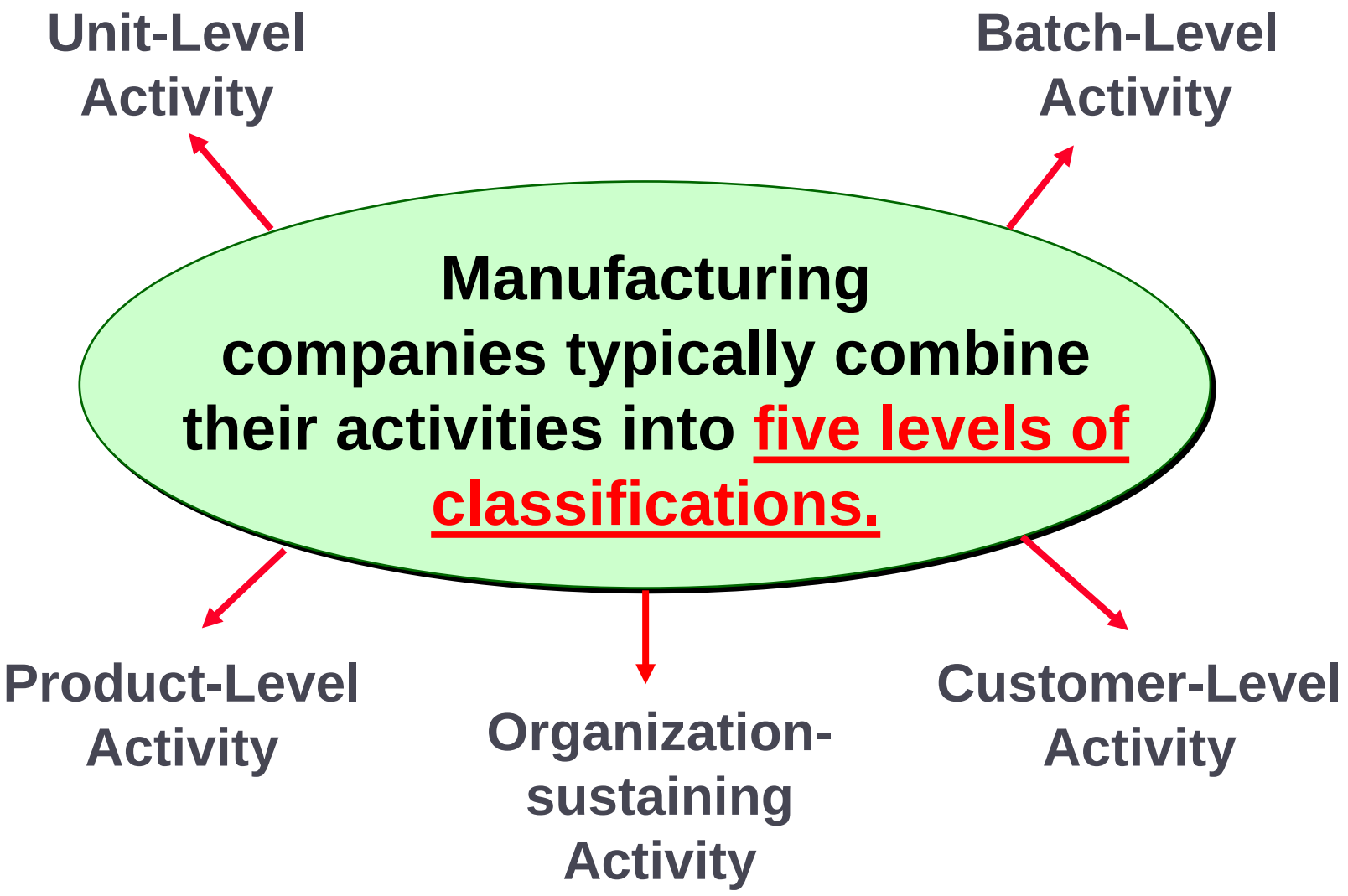
Activity Cost Pool

A "cost bucket" in which costs related to a single activity measure are accumulated.



Key:
ABC system allows non-manufacturing activity center and hence can allocate some non-manufacturing costs; also reduce the organization-level manufacturing costs allocated to products.

Cost Treatment Under Activity–Based Costing



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)**

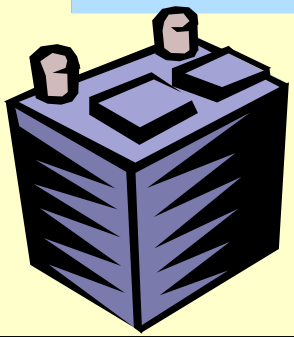
Under the traditional costing methods, the manufacturing overhead is allocated to products using a single plantwide overhead rate based on machine hours.

❶ Define Activities, Activity Cost Pools, and Activity Measures

The activities are often identified and defined by interviewing the employees that work in the respective overhead

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



The activity cost pools are often identified and defined by interviewing the employees that work in the respective overhead.

- **"Other" : (a) organization-level costs; (b) wasted resources due to idle capacity.**

❷ 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	Same as previous slide
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

❷ 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

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.

❷ Assign Overhead Costs to Activity Cost Pools

At Baxter Battery the following distribution of resource consumption is determined.

Could be due to idle capacity

	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%

Discuss:
What if the traditional costing system?

Only based on machine hours (order size -- that is the measure of machine hours)

	Customer Orders	Design Changes	Order Size	Customer Relations	Other	Total
Production Department						
Indirect factory wages						
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						

Discuss:
What if the traditional costing system?

Only based on machine hours (order size -- that is the measure of machine hours)

	Customer Orders	Design Changes	Order Size	Customer Relations	Other	Total
Production Department						
Indirect factory wages			100%			
Factory equipment depreciation			100%			
Factory utilities			100%			
Factory building lease			100%			
General Administrative Department						
Administrative wages and salaries			none			
Office equipment depreciation			none			
Administrative building lease			none			
Marketing Department						
Marketing wages and salaries			none			
Selling expenses			none			

❷ 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	
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

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❷ Assign Overhead Costs to Activity Cost Pools

	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	

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

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

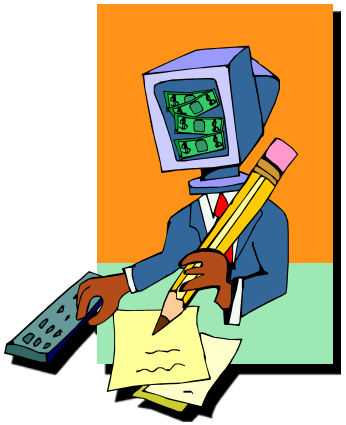
❷ Assign Overhead Costs to Activity Cost Pools

	Activity Cost Pools					
	Customer Orders	Design changes	Order Size	Customer Relations	Other	Total
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

❸ 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 (i.e., order size),
- 2,000 customers served.

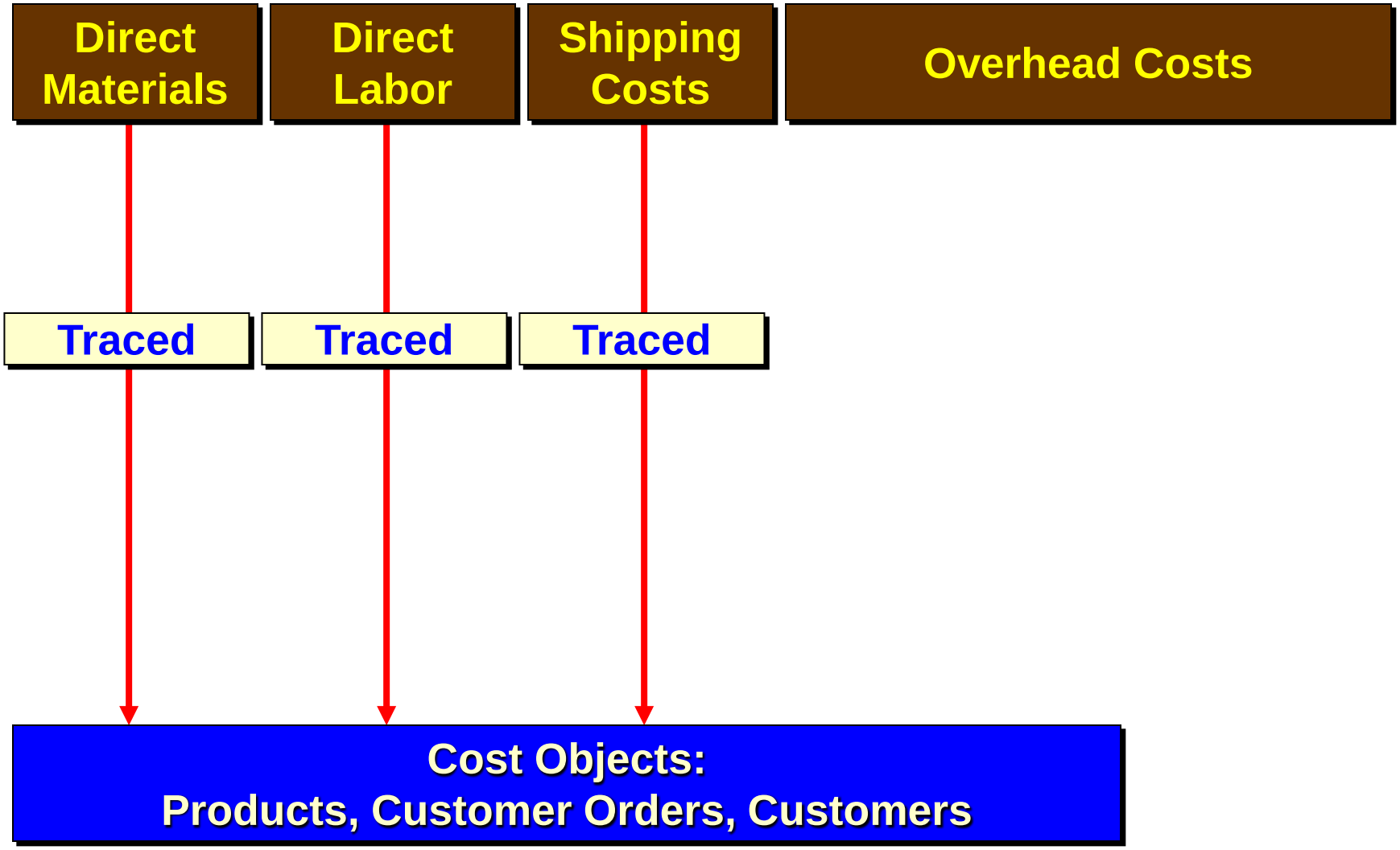


Now the team can compute the individual activity rates: dividing the total costs by the total activity levels.

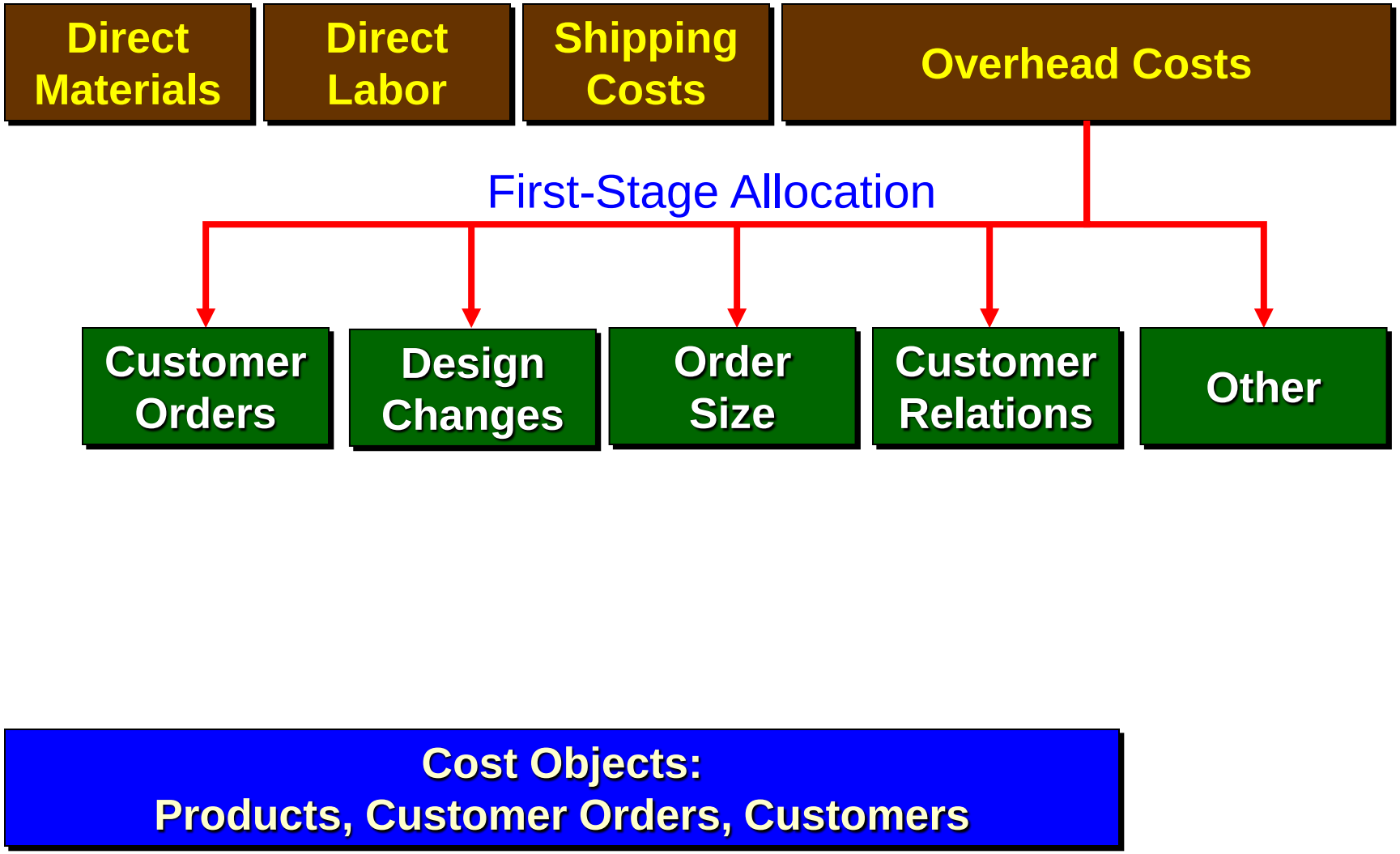
❸ Calculate Activity Rates

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		

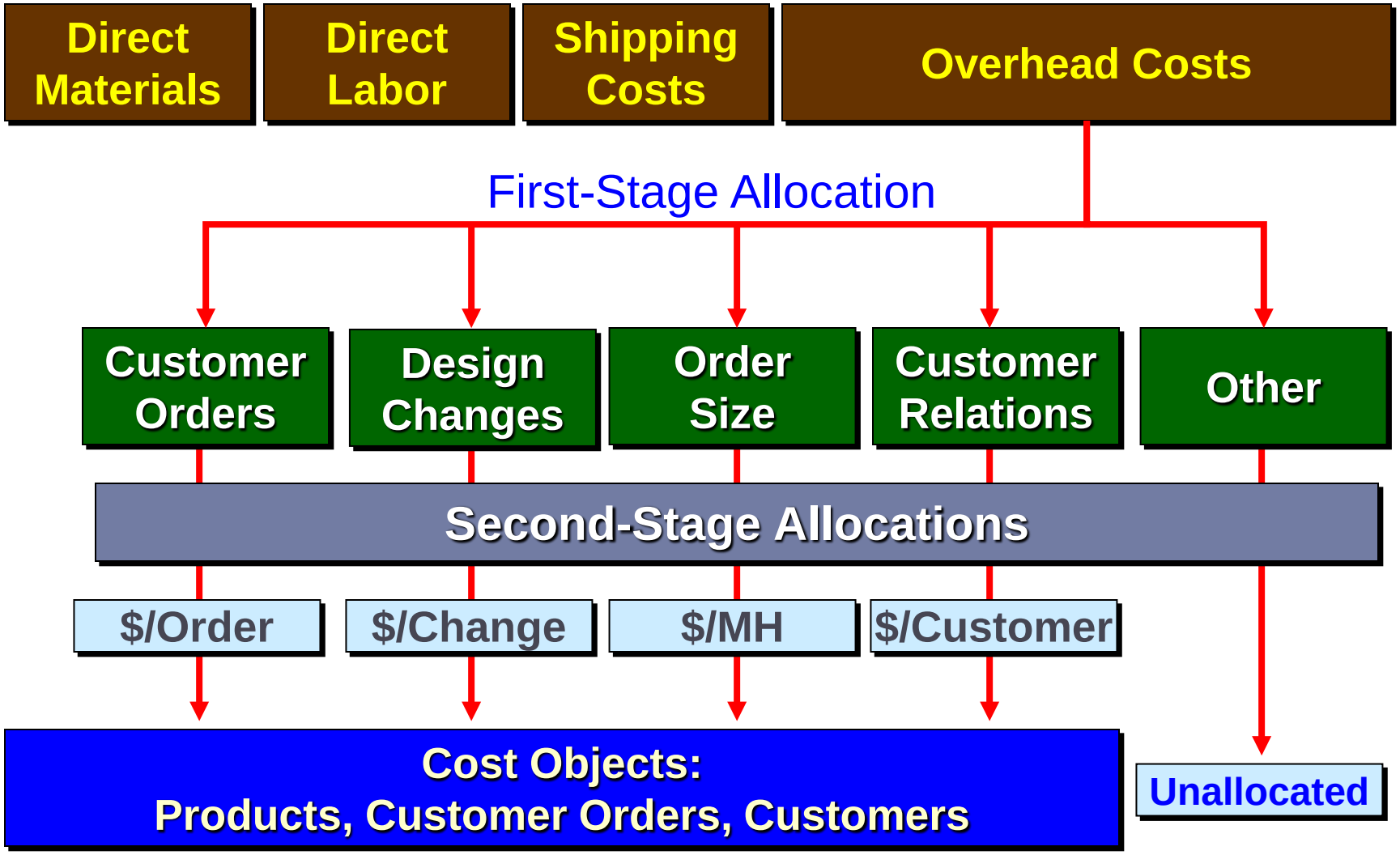
Activity–Based Costing at Baxter Battery



Activity–Based Costing at Baxter Battery



Activity–Based Costing at Baxter Battery



❹ 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

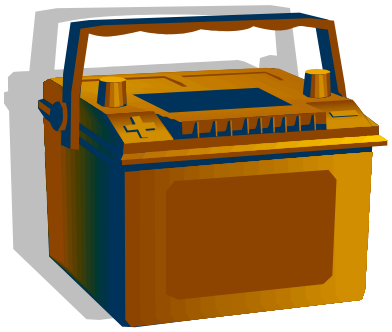
1. Requires new design resources.
2. 400,000 batteries ordered with 6,000 separate orders.
3. 4,000 custom designs prepared.
4. Each LongLife requires 48 minutes of machine time for a total of 320,000 machine-hours.

❹ 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

Hint:
"by product" means that we do not consider the overhead allocated to customer relationship (products do not directly consume CR resources).

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



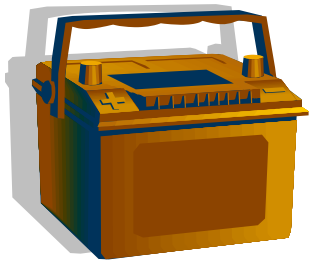
For SureStart, only two relevant activity pools; For LongLife, three relevant activity pools.

❺ 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	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
Shipping	2,000,000	1,000,000	3,000,000



❺ 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	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
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

❺ 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		LongLifes	
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		$ 8,372,000		$ (1,132,000)

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. Assume that the four orders for LongLifes required four design changes.

Orders

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

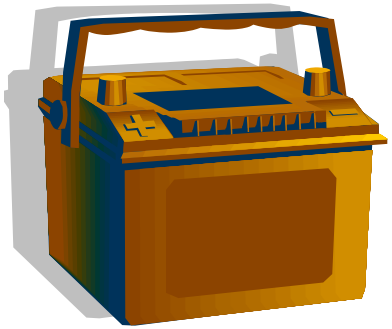
Machine-hours

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			
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			$ 12,916

Hint:
"by customer" means that we DO count the overhead allocated to customer relationship



Order size = 288+160= 448 machine hours.

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	**$ 29,200**
Direct costs	
Direct material	**7,500**
Direct labor	**6,700**
Shipping	**1,700**

Prepare Management Reports

Customer Margin (Profitability) Analysis

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

	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	1,540	28,816
Customer margin		$ 384

Highlight:

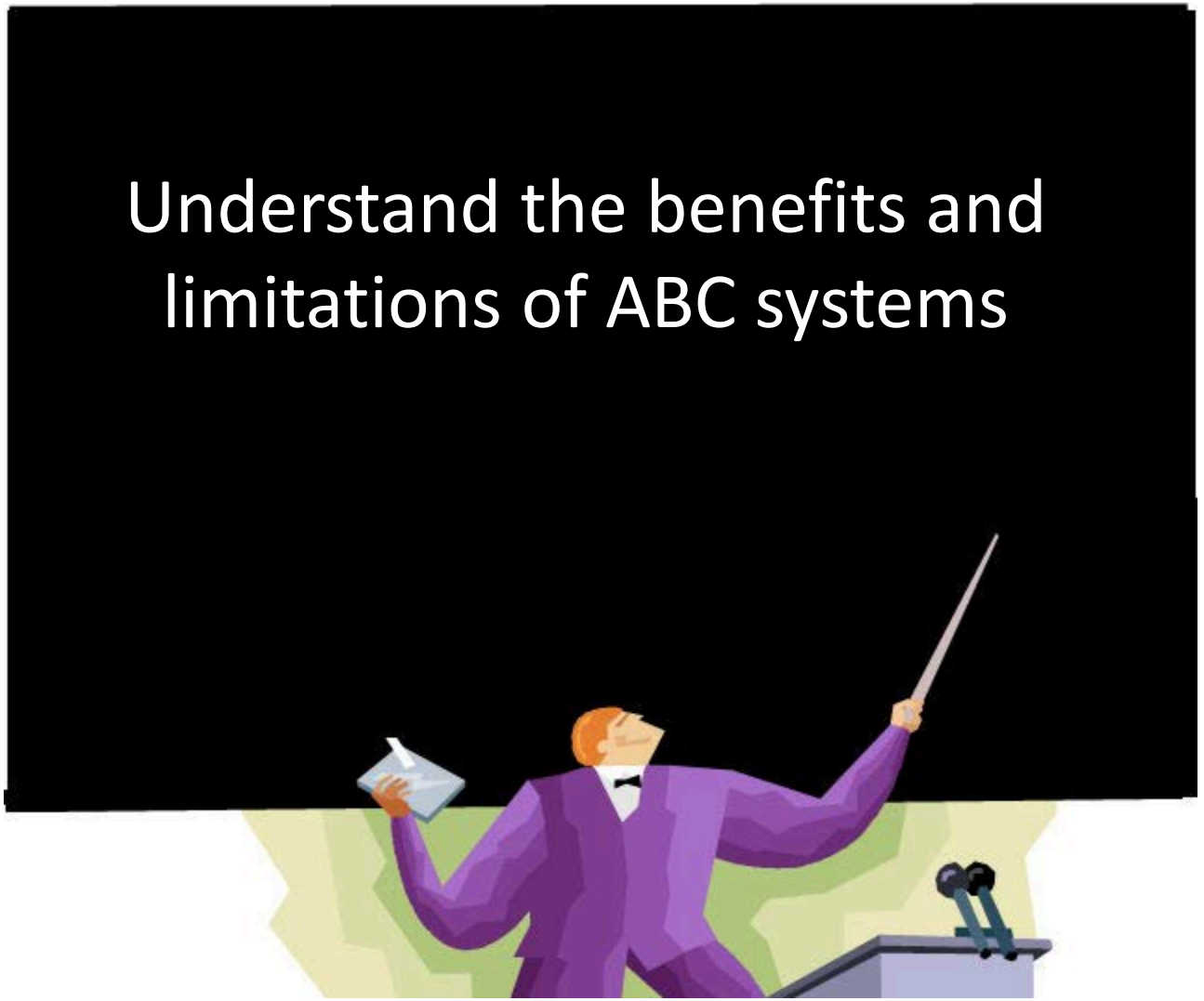
ABC facilitates the customer margin analysis by considering "customer relations" activity (i.e., "by customer" activity level)

In-class reading:
ABC for SuperTools.com

In-class exercise (P7-17):

Compare the traditional and ABC product margins

Learning Objective 2



Activity-Based Costing and External Reporting

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.

Signals that Suggest that ABC Implementation Could Help a Firm:

- Significant overhead costs allocated using one or two cost pools.
- Most or all overhead is considered unit-level.
- Products that consume different amounts of resources.
- Products that a firm should successfully make and sell consistently show small profits.
- Operations staff disagreeing with accounting over manufacturing and marketing costs.

ABC Limitations

Resistance to unfamiliar numbers and reports.

Managers' Desire to fully allocate all costs to products.

- ABC systems produce numbers, such as product margins, that are at odds with the numbers produced by traditional cost systems. Managers are not accustomed to managing their operations using these numbers; hence, ABC inevitably faces resistance. This underscores the importance of having top management support for and cross-functional involvement with the ABC implementation.

- In practice, most managers insist on fully allocating all costs to products. The ABC system described in the main portion of this chapter does not conform to this preference.
  (further discussion: why middle-level managers do not like ABC in general?)

ABC Limitations

Potential misinterpretation of unfamiliar numbers.

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

Substantial resources required to implement and maintain.

- Implementing an ABC system requires substantial resources
- ABC systems **do not automatically identify the relevant costs** for particular decisions; therefore, ABC data can be easily misinterpreted and must be used with care when making decisions. Costs assigned to products, customers, and other cost objects are only potentially relevant.
- most organizations use ABC as a supplement to rather a replacement for their existing cost system. Maintaining two cost systems is costlier than maintaining just one system.

- In-class case: Classic Pen Company.

- Homework:#3 (See Moodle for the file)

End of Chapter 7