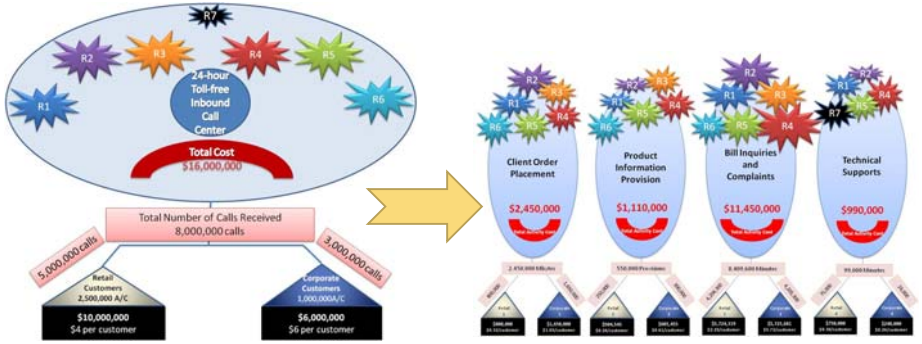
Activity-Based Costing: A Tool to Aid Decision Making

Chapter 7

Activity–Based Costing (ABC)

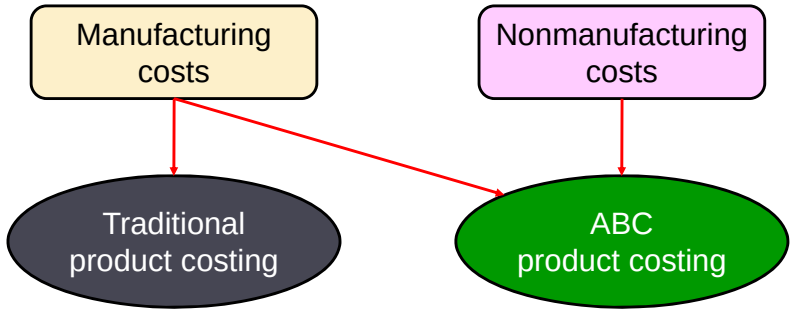
ABC is designed to provide managers with cost information for strategic and other decisions that potentially affect capacity and therefore affect "fixed" as well as variable costs.

An Brief Overview



How Costs are Treated Under Activity–Based Costing

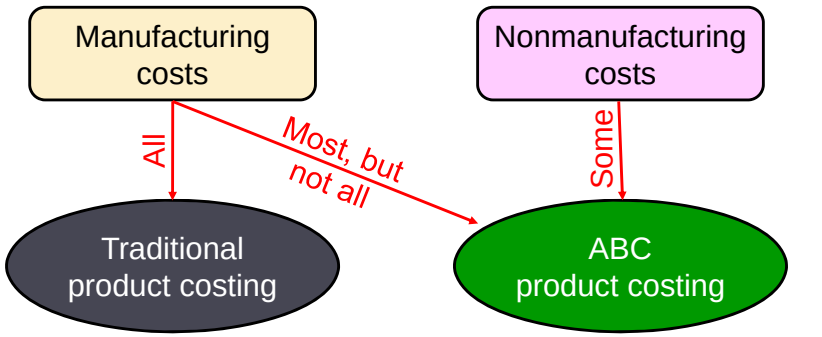
ABC differs from traditional cost accounting in three ways.



❶ ABC assigns both types of costs to products.

How Costs are Treated Under Activity–Based Costing

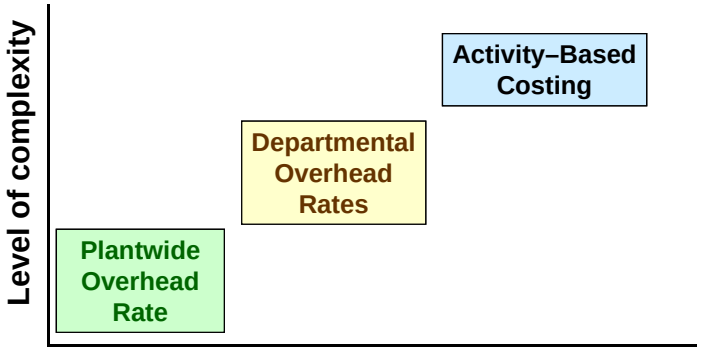
ABC differs from traditional cost accounting in three ways.



❷ 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.



❸ ABC uses more cost pools.

How Costs are Treated Under 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.

How Costs are Treated Under Activity–Based Costing

Activity Measure → An allocation base in an activity-based costing system.

The term cost driver is also used to refer to an activity measure.

How Costs are Treated Under Activity–Based Costing

Two common types of activity measures:

Transaction driver	Duration driver
Simple count of the number of times an activity occurs.	A measure of the amount of time needed for an activity.

How Costs are Treated Under Activity–Based Costing

Manufacturing companies typically combine their activities into five classifications.

- **Unit-Level Activity**
- **Batch-Level Activity**
- **Product-Level Activity**
- **Organization-sustaining Activity**
- **Customer-Level Activity**

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, 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)

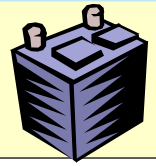
Manufacturing overhead is allocated to products using a single plantwide overhead rate based on machine hours.

❶ 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



❶ 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

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

❷ 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%

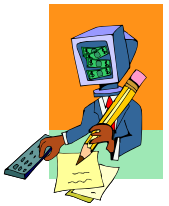
❷ Assign Overhead Costs to Activity Cost Pools

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,
- 2,000 customers served.

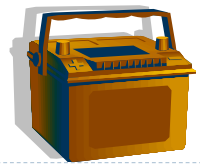


Now the team can compute the individual activity rates by dividing the total cost for each activity by the total activity levels.

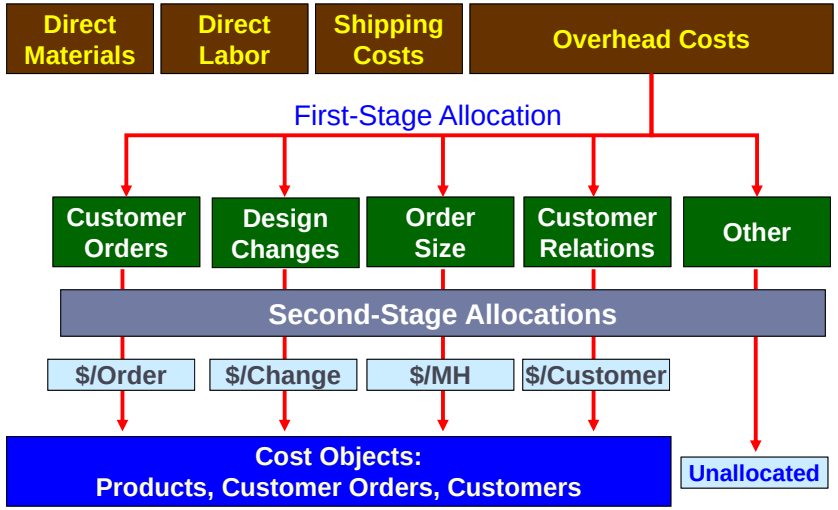
❸ Calculate Activity Rates

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



❹ Assigning Overhead to Products

Baxter Battery Information

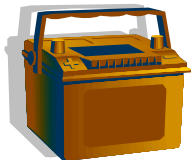
SureStart
1. Requires no new design resources.
2. 800,000 batteries ordered with 4,000 separate orders.
3. Each SureStart requires 36 minutes of machine time for a total of 480,000 machine-hours.

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



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

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

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

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)

❺ 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	$ 8,372,000	$ (1,132,000)	$ 7,240,000
Less costs not assigned to products:			
Customer relations			3,080,000
Other			6,160,000
Total			9,240,000
Net operating loss			$ (2,000,000)

❺ 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

❺ 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	$ 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

❺ 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		$ 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

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

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	$ 14,000,000

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

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

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			$ 14,000,000

480,000 hours × $17.50 per hour = $8,400,000

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	24,400,000	5,600,000	16,600,000	14,000,000	41,000,000
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
	$ 11,000,000

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.

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.

❶ 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.

❷ 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.

❸ 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.