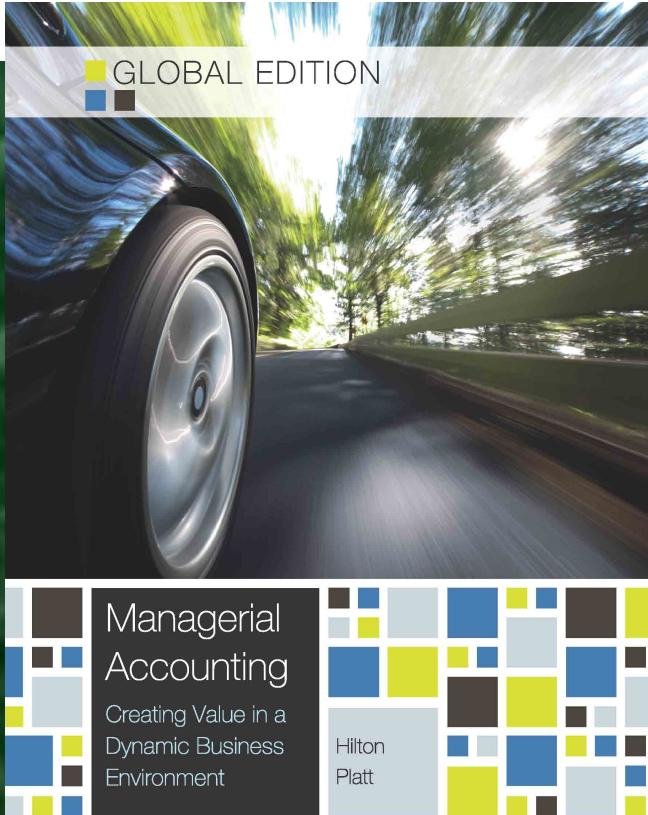


# CHAPTER 5



## Activity-Based Costing and Management



# Learning Objective 1

# Traditional, Volume-Based Product-Costing System

- Aerotech produces three complex printed circuit boards referred to as Mode I, Mode II, and Mode III.
- The following information is obtained from company records:

	Mode I	Mode II	Mode III
<b>Production:</b>			
Units	10,000	20,000	4,000
Runs	1 run of 10,000 units	4 runs of 5,000 units	10 runs of 400 units

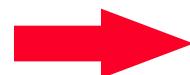
# Traditional, Volume-Based Product-Costing System

	Mode I	Mode II	Mode III
Direct materials	\$ 50.00	\$ 90.00	\$ 20.00
Direct labor	60.00	80.00	40.00
Manufacturing overhead	99.00	132.00	66.00
Total	\$ 209.00	\$ 302.00	\$ 126.00

Additional information includes:

	Mode I	Mode II	Mode III
Direct materials	\$ 50.00	\$ 90.00	\$ 20.00
Direct labor (hr/board)	3	4	2
Setup time (hr/run)	10	10	10
Machine time (hr/board)	1	1.25	2

Manufacturing overhead is determined as follows



# Traditional, Volume-Based Product-Costing System

	Mode I	Mode II	Mode III
Units produced	10,000	20,000	4,000
Direct labor (hr/unit)	3	4	2
Total hours	30,000	80,000	8,000
Total hours required			118,000

Budgeted manufacturing overhead  

$$\frac{\$3,894,000}{118,000} = \$33 \text{ per hour}$$

	Mode I	Mode II	Mode III
Direct labor (hr/unit)	3	4	2
Overhead rate per hour	\$ 33	\$ 33	\$ 33
Overhead per unit	\$ 99	\$ 132	\$ 66

# Traditional, Volume-Based Product-Costing System

With these product costs, Aerotech established target selling prices (Cost  $\times$  125%).

	Mode I	Mode II	Mode III
Direct materials	\$ 50.00	\$ 90.00	\$ 20.00
Direct labor	60.00	80.00	40.00
Manufacturing overhead	99.00	132.00	66.00
Total	<b>\$ 209.00</b>	<b>\$ 302.00</b>	<b>\$ 126.00</b>

	Mode I	Mode II	Mode III
Cost per unit	\$ 209.00	\$ 302.00	\$ 126.00
Target selling price	<b>261.25</b>	377.50	157.50

$$209.00 \times 1.25$$

# Learning Objective 2

This book is simple good def

# Activity Based Costing System (ABC)

ABC systems follow a ~~two-stage~~ procedure to assign overhead costs to products.

## Stage One

Identify significant activities and assign overhead costs to each activity in proportion to resources used.

## Stage Two

Identify cost drivers appropriate to each activity and allocate overhead to the products.

16.09.18

# Learning Objective 3

## Overhead Costs

Total budgeted cost = \$3,894,000

Activity must be done on each unit produced.

Unit-  
Level

Machinery  
cost pool  
\$1,212,600

Activity performed on each batch produced.

Batch-  
Level

Setup  
cost pool  
\$3,000

Activities needed to support an entire product line

Product-  
Sustaining-  
Level

Engineering  
cost pool  
\$700,000

Activity required in order for the production process to occur.

Identification  
of Activity  
Cost Pools

Facility-  
Level

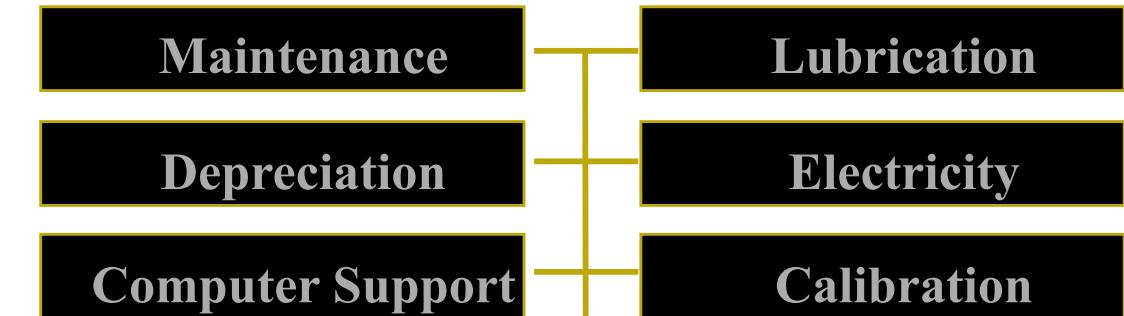
Facility  
cost pool  
\$507,400

Unit-Level	Batch-Level	Product-Sustaining-Level	Facility-Level
Machinery cost pool \$1,212,600	Setup cost pool \$3,000	Engineering cost pool \$700,000	Facility cost pool \$507,400
			
			
	Receiving/Inspection cost pool \$200,000		
	Material-Handling cost pool \$600,000		
	Quality-Assurance cost pool \$421,000		
	Packaging/Shipping cost pool \$250,000		

# Learning Objectives 3 & 4

# STAGE ONE

Various overhead costs related to **machinery**



Activity  
cost  
pool

**Machinery Cost Pool**  
Total budgeted cost =  
\$1,212,600

# STAGE TWO

Calculate  
the pool  
rate

Cost  
Assignment

Budgeted Machinery Costs

\$1,212,600

Budgeted Machine Hours=  
43,000 → given -

\$28.20/hour

**Mode I:**

\$28.20 per hr.

1 hr. per unit

\$28.20 per unit

**Mode II:**

\$28.20 per hr.

1.25 hr. per unit

\$35.25 per unit

**Mode III:**

\$28.20 per hr.

2 hr. per unit

\$56.40 per unit

# STAGE ONE

Calculation of  
total setup cost

Total budgeted setup cost

\$20 per hour

10 hr. per setup

---

\$200 cost per setup

15 production runs

---

\$ 3,000 Total

$$1 + 4 + 10 \\ = 15 \text{ total}$$

for all models

Activity  
cost  
pool

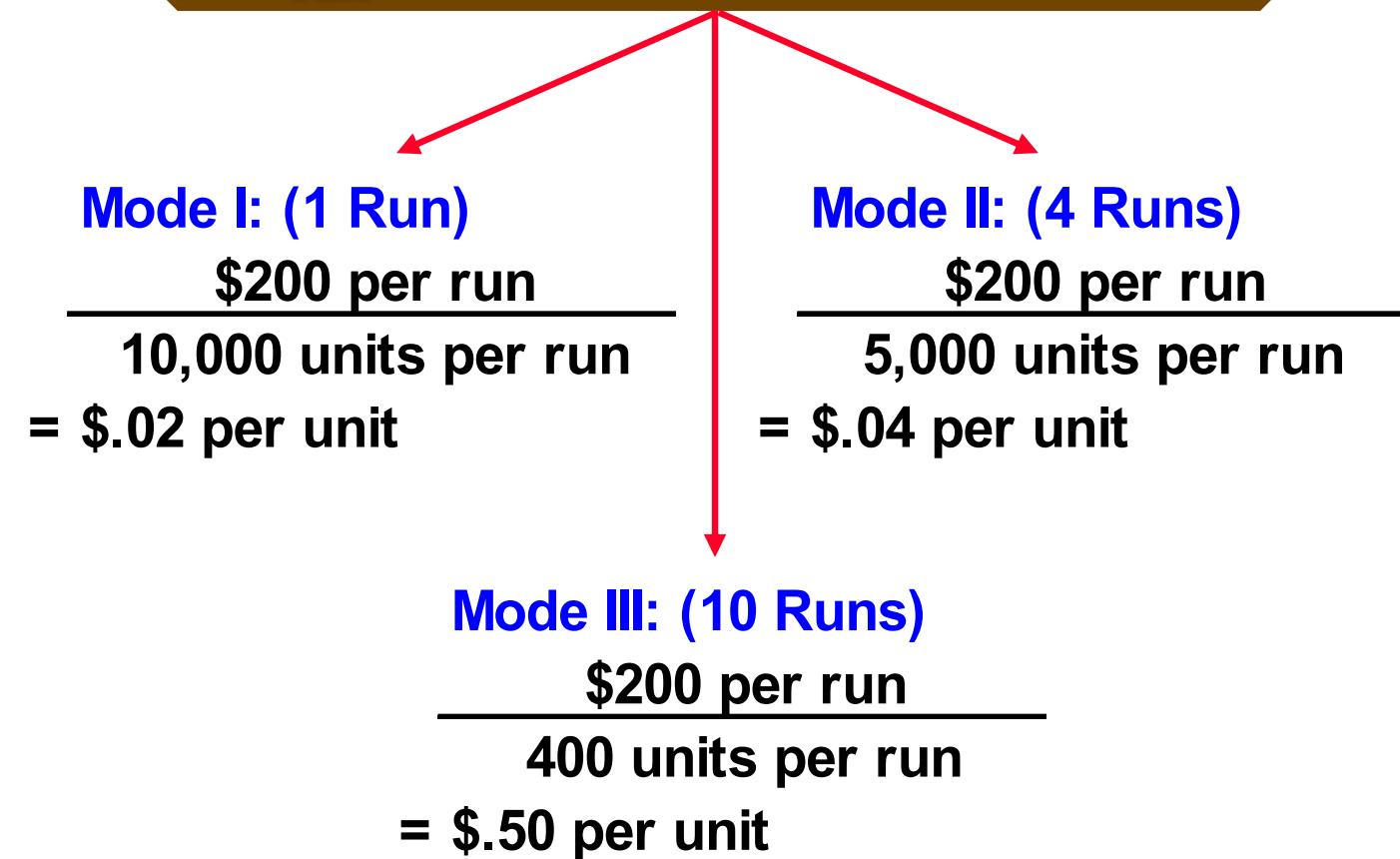
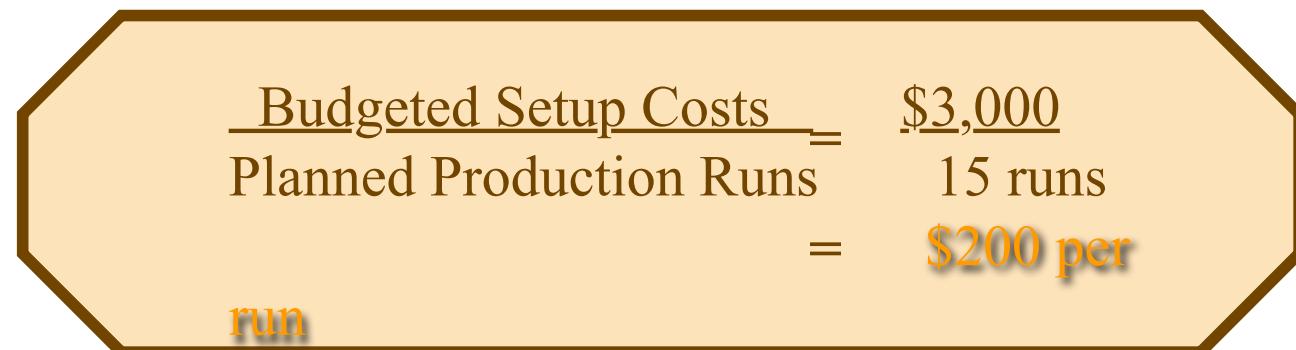
Setup Cost Pool

Total budgeted cost = \$3,000

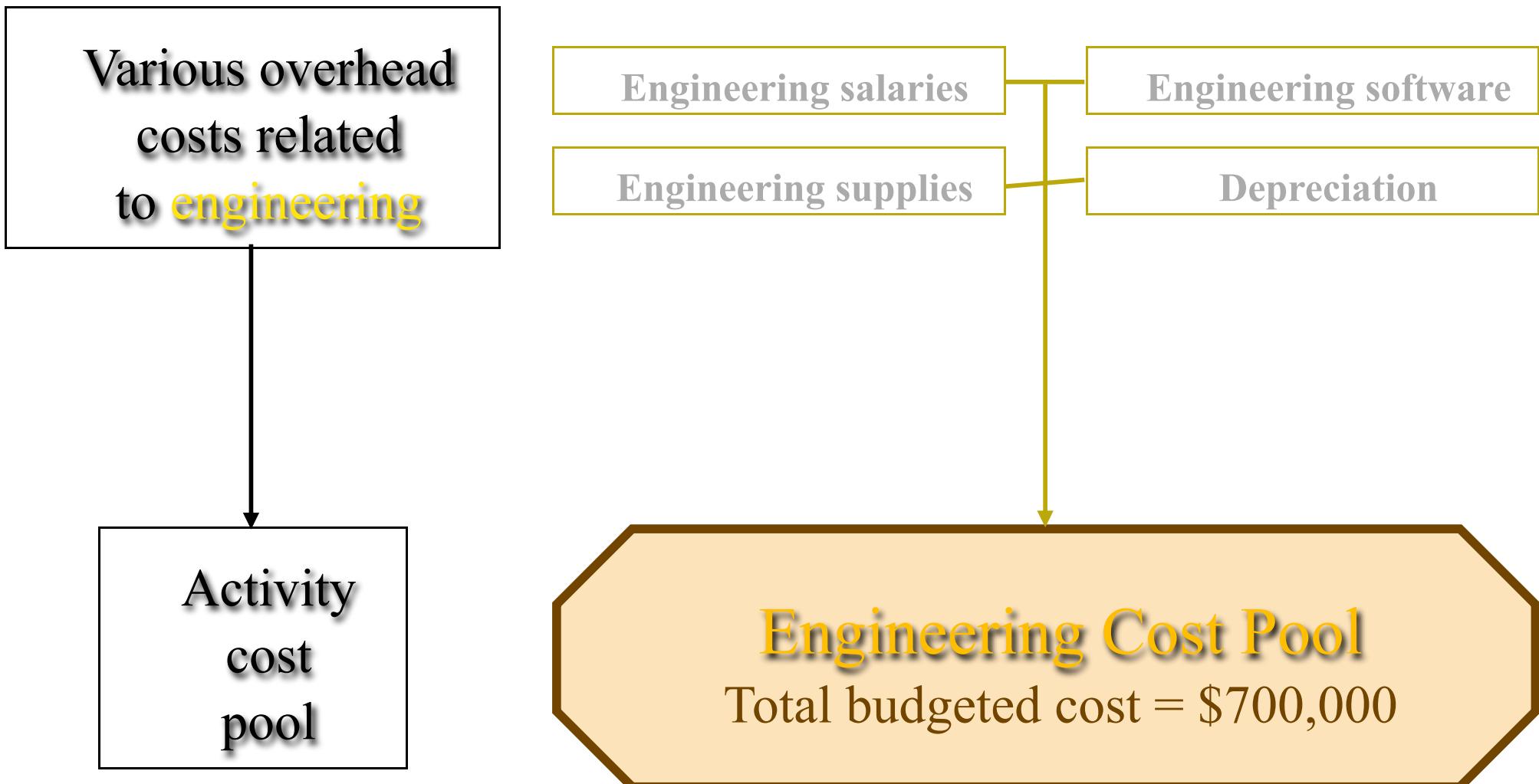
# STAGE TWO

Calculate  
the pool  
rate

Cost  
Assignment



# STAGE ONE



# STAGE TWO

Allocate based  
on engineering  
transactions

no cost driver  
relative to eng

Cost  
Assignment

Engineering Cost Pool  
Total budgeted cost = \$700,000

Mode I:

$$\frac{25\% \times \$700,000}{10,000 \text{ units}} = \$17.50 \text{ per unit}$$

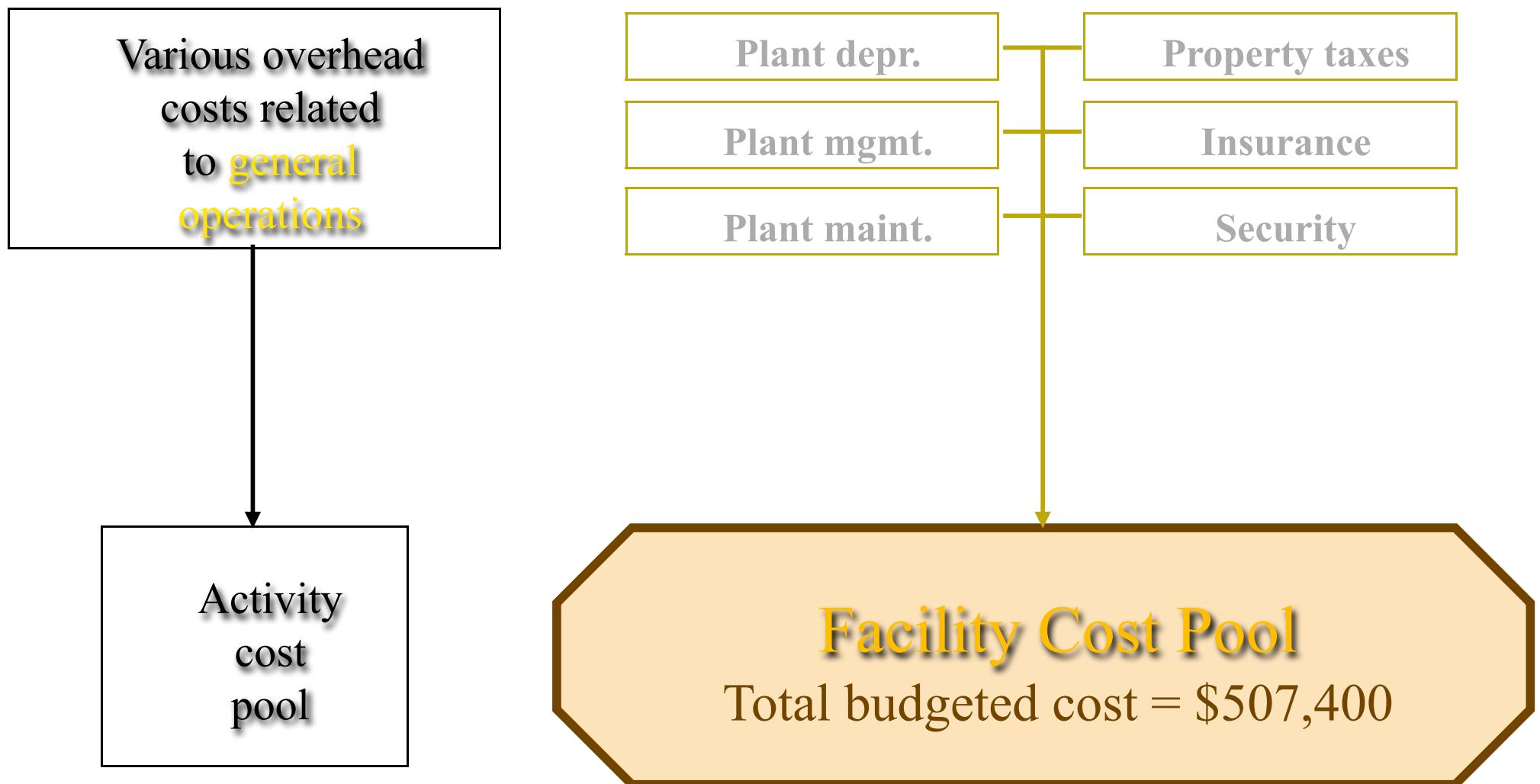
Mode II:

$$\frac{45\% \times \$700,000}{20,000 \text{ units}} = \$15.75 \text{ per unit}$$

Mode III:

$$\frac{30\% \times \$700,000}{4,000 \text{ units}} = \$52.50 \text{ per unit}$$

# STAGE ONE



# STAGE TWO

Calculate  
the pool  
rate

Cost  
Assignment

Budgeted Facilities Cost =  
\$507,400

Budgeted Direct-Labor Hours  
118,000

\$4.30/hour

The diagram illustrates the calculation of cost assignment rates for three modes. At the top, a box contains the budgeted facilities cost (\$507,400) and budgeted direct-labor hours (118,000). A red arrow points from this box to the Mode I calculation. Another red arrow points from the same box to the Mode II calculation. A third red arrow points from the same box to the Mode III calculation. The Mode I calculation shows \$4.30 per hour multiplied by 3 hours per unit, resulting in \$12.90 per unit. The Mode II calculation shows \$4.30 per hour multiplied by 4 hours per unit, resulting in \$17.20 per unit. The Mode III calculation shows \$4.30 per hour multiplied by 2 hours per unit, resulting in \$8.60 per unit.

**Mode I:**  
$$\times \frac{3 \text{ hr. per unit}}{\$12.90 \text{ per unit}}$$

**Mode II:**  
$$\times \frac{4 \text{ hr. per unit}}{\$17.20 \text{ per unit}}$$

**Mode III:**  
$$\times \frac{2 \text{ hr. per unit}}{\$8.60 \text{ per unit}}$$

# Other Overhead Costs

## Receiving and Inspection Cost Pool

Board	Overhead	$\times$	%	$\div$	Units	= Cost/Unit
Mode I	\$ 200,000	$\times$	6%	$\div$	10,000	= \$ 1.20
Mode II	200,000	$\times$	24%	$\div$	20,000	= 2.40
Mode III	200,000	$\times$	70%	$\div$	4,000	= 35.00

105 given

TC for other mode

in mode II  
mode III  
Total other



## Material-Handling Cost Pool

Board	Overhead	$\times$	%	$\div$	Units	= Cost/Unit
Mode I	\$ 600,000	$\times$	7%	$\div$	10,000	= \$ 4.20
Mode II	600,000	$\times$	30%	$\div$	20,000	= 9.00
Mode III	600,000	$\times$	63%	$\div$	4,000	= 94.50

## Quality-Assurance Cost Pool

Board	Overhead	$\times$	%	$\div$	Units	= Cost/Unit
Mode I	\$ 421,000	$\times$	20%	$\div$	10,000	= \$ 8.42
Mode II	421,000	$\times$	40%	$\div$	20,000	= 8.42
Mode III	421,000	$\times$	40%	$\div$	4,000	= 42.10



## Packaging and Shipping Cost Pool

Board	Overhead	$\times$	%	$\div$	Units	= Cost/Unit
Mode I	\$ 250,000	$\times$	4%	$\div$	10,000	= \$ 1.00
Mode II	250,000	$\times$	30%	$\div$	20,000	= 3.75
Mode III	250,000	$\times$	66%	$\div$	4,000	= 41.25



# Other Overhead Costs



## Receiving and Inspection Cost Pool

Board	Overhead	$\times$	%	$\div$	Units	= Cost/Unit
Mode I	\$ 200,000	$\times$	6%	$\div$	10,000	= 1.20
Mode II	200,000	$\times$	24%	$\div$	20,000	= 2.40
Mode III	200,000	$\times$	70%	$\div$	4,000	= 35.00

## Material-Handling Cost Pool

Board	Overhead	$\times$	%	$\div$	Units	= Cost/Unit
Mode I	\$ 600,000	$\times$	7%	$\div$	10,000	= \$ 4.20
Mode II	600,000	$\times$	30%	$\div$	20,000	= 9.00
Mode III	600,000	$\times$	63%	$\div$	4,000	= 94.50

**\$14.82**

## Quality-Assurance Cost Pool

Board	Overhead	$\times$	%	$\div$	Units	= Cost/Unit
Mode I	\$ 421,000	$\times$	20%	$\div$	10,000	= \$ 8.42
Mode II	421,000	$\times$	40%	$\div$	20,000	= 8.42
Mode III	421,000	$\times$	40%	$\div$	4,000	= 42.10



## Packaging and Shipping Cost Pool

Board	Overhead	$\times$	%	$\div$	Units	= Cost/Unit
Mode I	\$ 250,000	$\times$	4%	$\div$	10,000	= \$ 1.00
Mode II	250,000	$\times$	30%	$\div$	20,000	= 3.75
Mode III	250,000	$\times$	66%	$\div$	4,000	= 41.25



# Product Cost from ABC

These are the new product costs when Aerotech uses ABC.

	Mode I	Mode II	Mode III
Direct materials	\$ 50.00	\$ 90.00	\$ 20.00
Direct labor	60.00	80.00	40.00
Machinery	28.20	35.25	56.40
Setup	0.02	0.04	0.50
Engineering	17.50	15.75	52.50
Facilities	12.90	17.20	8.60
Other	14.82	23.57	212.85
Total	\$ 183.44	\$ 261.81	\$ 390.85

= allocation of MOH

# Learning Objective 5

# Distorted Product Costs

Both original and ABC target selling prices are based on  $(\text{Cost} \times 125\%)$ .

	Mode I	Mode II	Mode III
Traditional costing	\$ 209.00	\$ 302.00	\$ 126.00
ABC costing	183.44	261.81	390.85
Original target selling price	261.25	377.50	157.50
ABC target selling price	229.30	327.26	488.56

The selling price of Mode I and II are decreased, while the selling price for Mode III is increased.

$$[\$209.00 \times 1.25]$$

*selling p markup*

$$[\$183.44 \times 1.25]$$

# Distorted Product Costs

Can you identify any problems Aerotech is likely to face as a result of this distortion?

	Mode I	Mode II	Mode III
Traditional costing	\$ 209.00	\$ 302.00	\$ 126.00
ABC costing	183.44	261.81	390.85
Cost distortion per unit	25.56	40.19	(264.85)
Units produced	10,000	20,000	4,000
Total cost distortion	255,600	803,800	(1,059,400)

Traditional costing understates the cost of complex, low volume products.

# Two Key Points

## A large proportion of non-unit-level activities

A unit-level cost driver, such as direct labor, machine hours, or throughput, will not be able to assign the costs of non-unit-level activities accurately.



## Product diversity

When the consumption ratios differ widely between activities, no single cost driver will accurately assign the resulting overhead costs.



# Learning Objective 6

# Cost Drivers

A characteristic of an event or activity that results in the incurrence of costs. In selecting a cost driver, we must consider . . .

Degree of Correlation



Behavioral Effects

Cost of Measurement

# Learning Objective 7

# COLLECTING ABC DATA

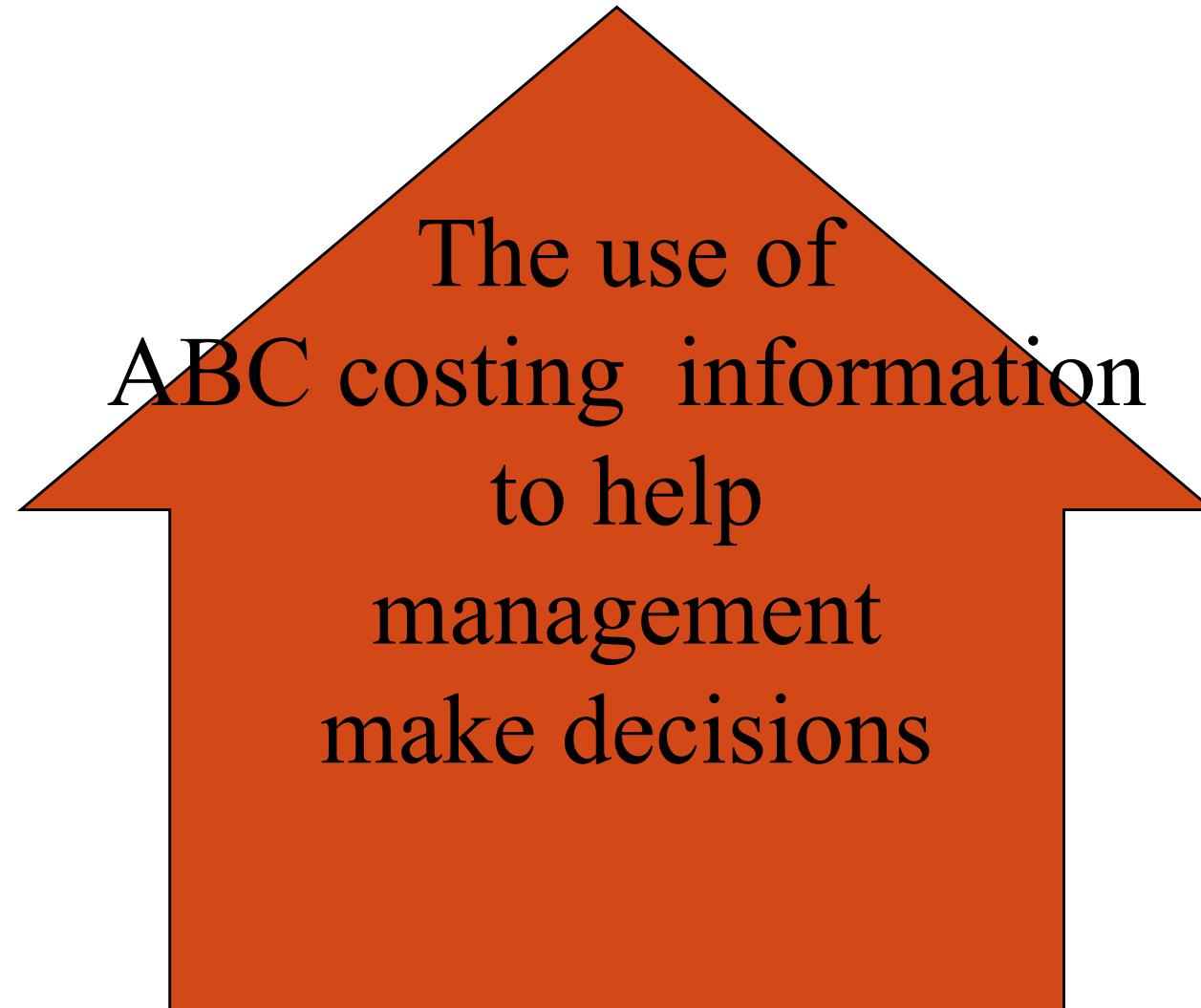
1 **INTERVIEWS AND PAPER TRAILS** - The information for ABC systems initially comes from interviews with employees in the support departments and a review of each department's records.

2 **STORYBOARDING** - A procedure used to develop a detailed process flow chart, which visually represents activities and the relationships among activities.

3 **MULTIDISCIPLINARY ABC PROJECT TEAMS** – To gather information from all facets of an organization's operations, it is essential to involve personnel from a variety of functional areas. A typical ABC project team includes **ACCOUNTING, FINANCE, PRODUCTION, OPERATIONS, ENGINEERS, MARKETING**, etc.

# Learning Objective 8

# Activity-Based Management



# Activity-Based Management

**Activity-based costing establishes relationships between overhead costs and activities so that we can better allocate overhead costs.**

**Activity-based management focuses on managing activities to reduce costs.**

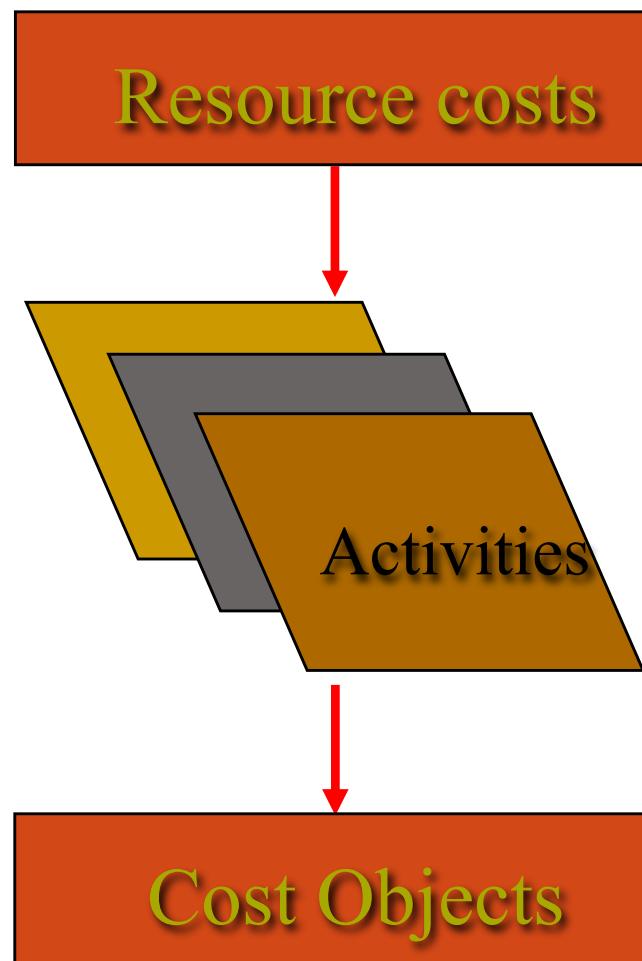


# Two-Dimensional ABC and Activity-Based Management

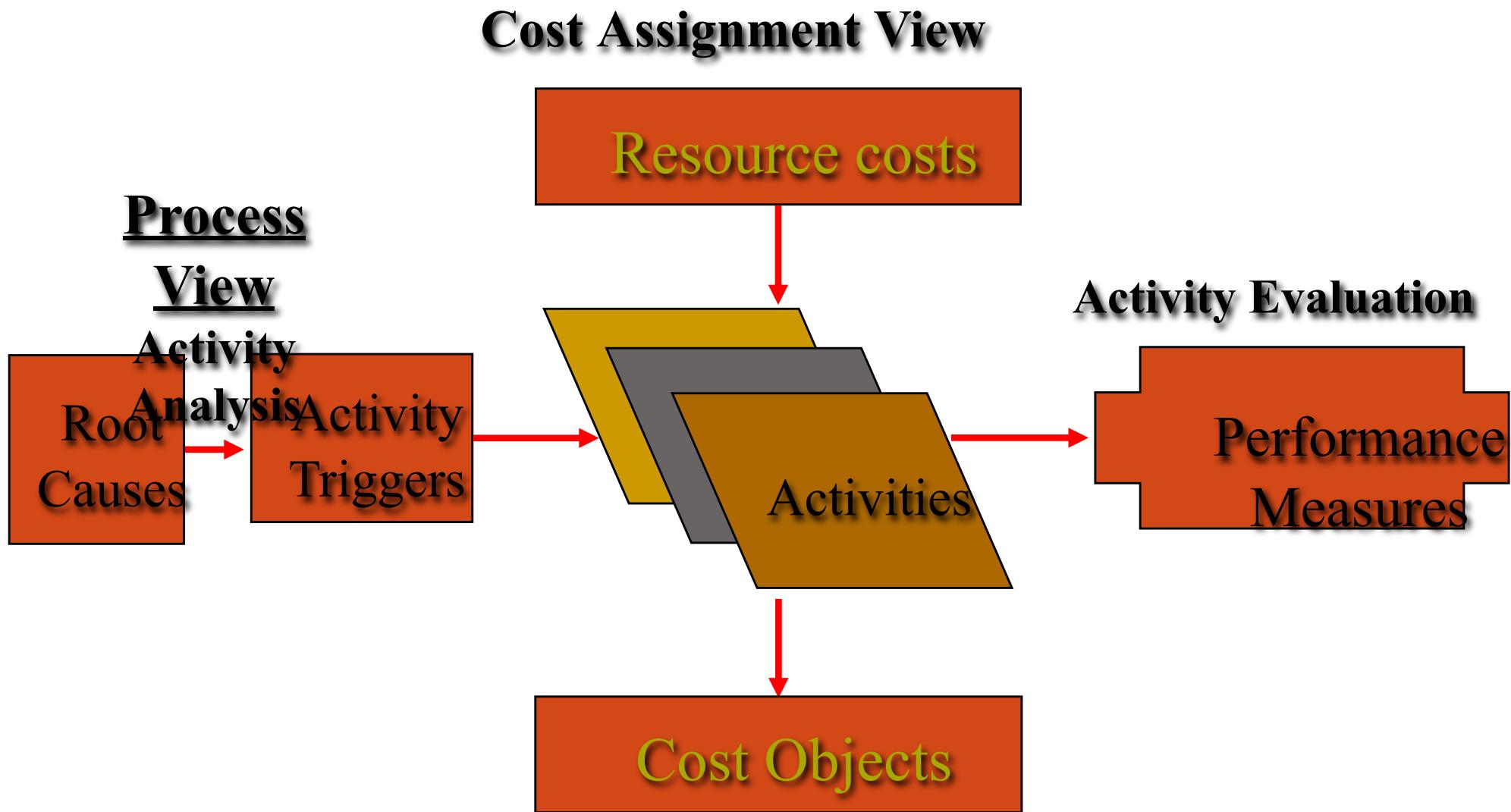


# Two-Dimensional ABC and Activity-Based Management

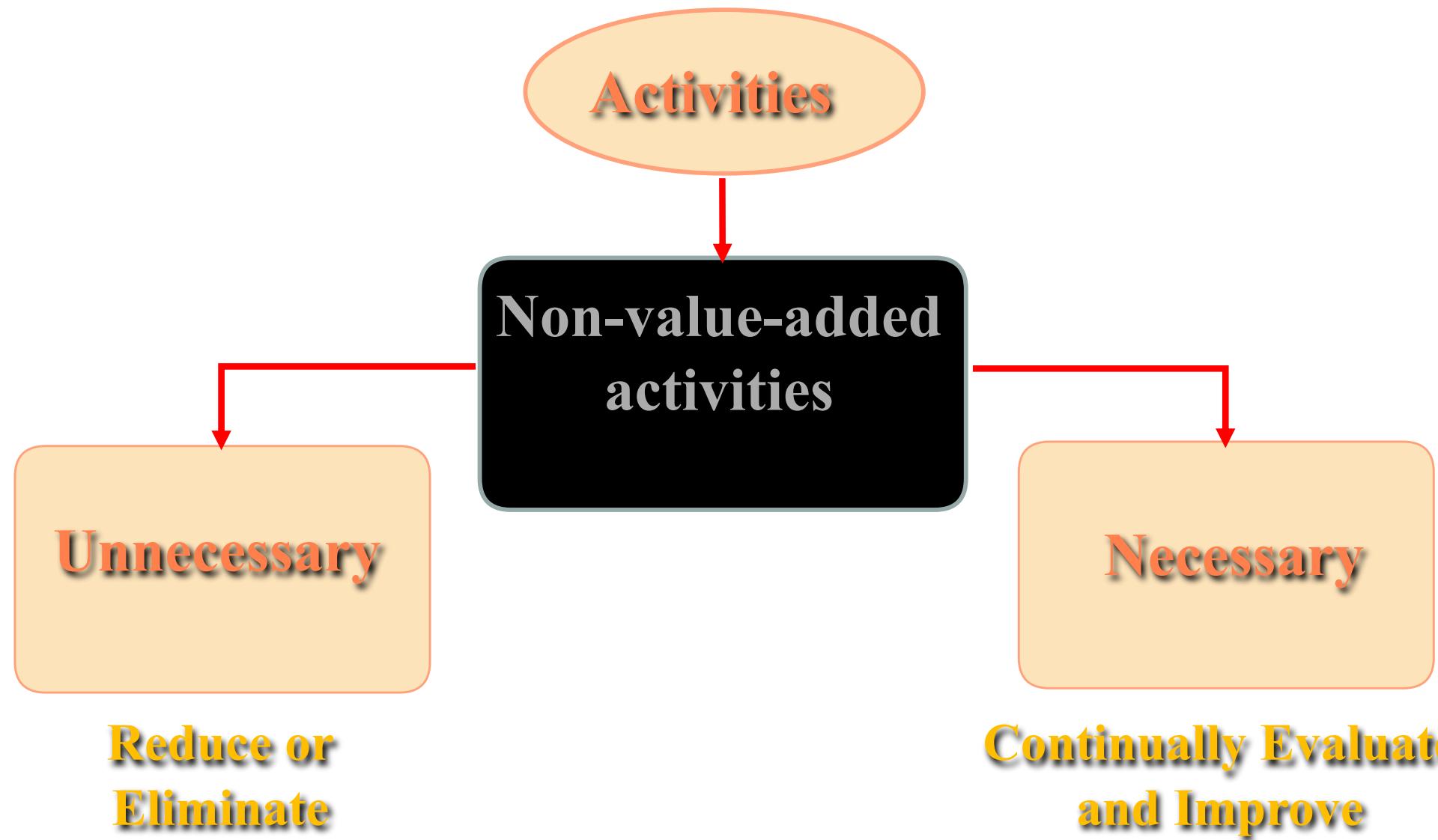
## Cost Assignment View



# Two-Dimensional ABC and Activity-Based Management



# Elimination of Non-Value-Added Costs

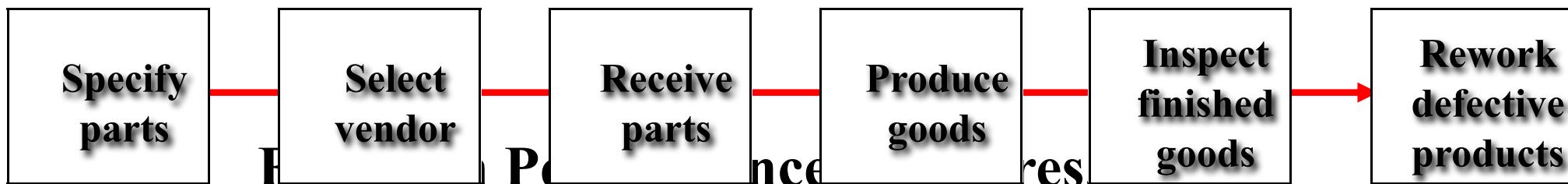


# Using ABM to Eliminate Non-Value-Added Activities and Costs

**Identify Activities.**

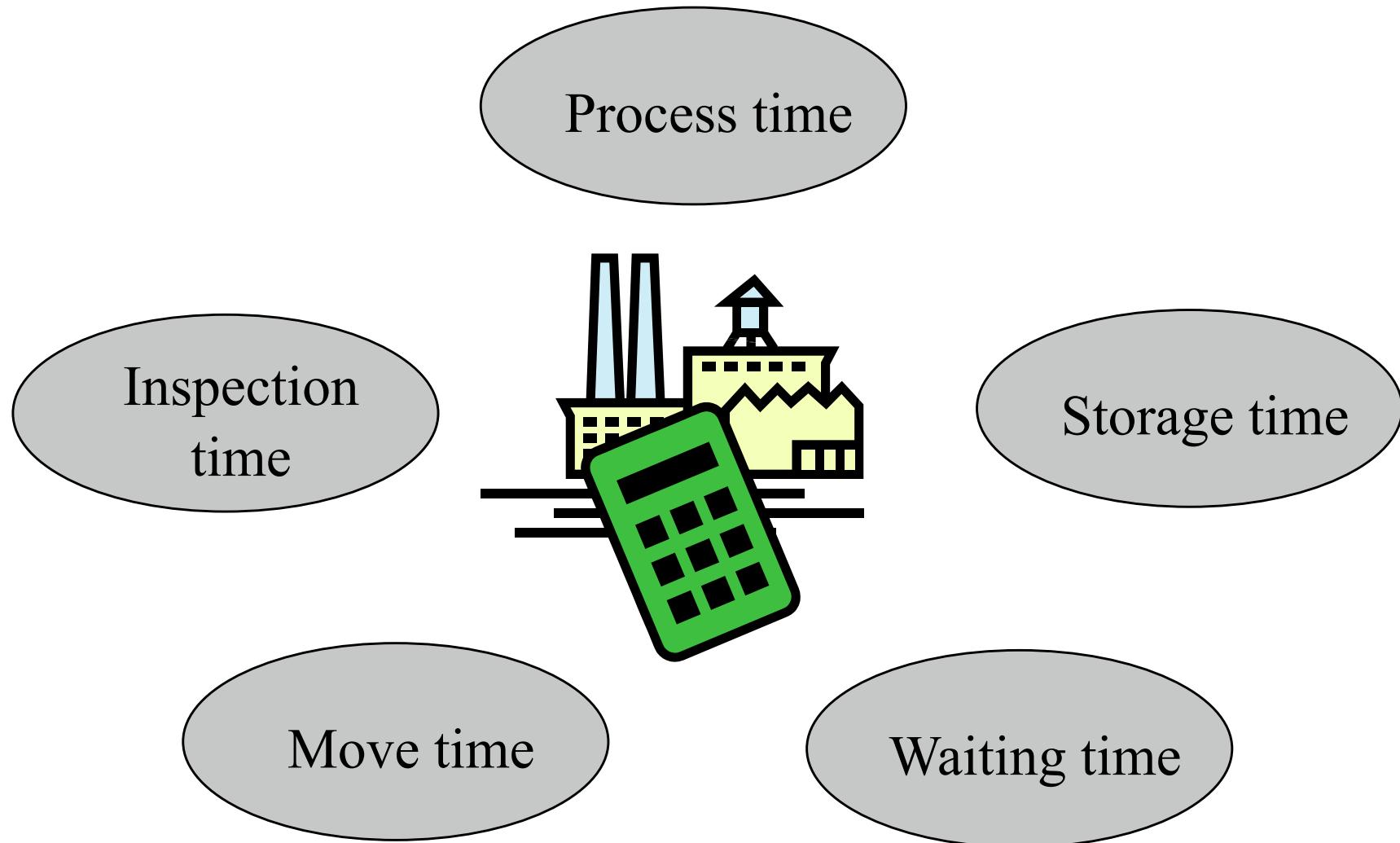
**Identify Non-Value-Added Activities.**

**Understand Activity Linkages, Root Causes, and Triggers.**



**Report Non-Value-Added Costs.**

# Using ABM to Eliminate Non-Value-Added Activities and Costs



# Learning Objective 9

# Customer Profitability Analysis

**Customer profitability analysis uses activity-based costing to determine the activities, costs, and profit associated with serving particular customers.**



# Customer Profitability Analysis

Orders  
small  
quantities

Often  
changes  
orders

Required  
special  
packaging

Demand  
fast  
service

Orders  
frequently



A costly customer

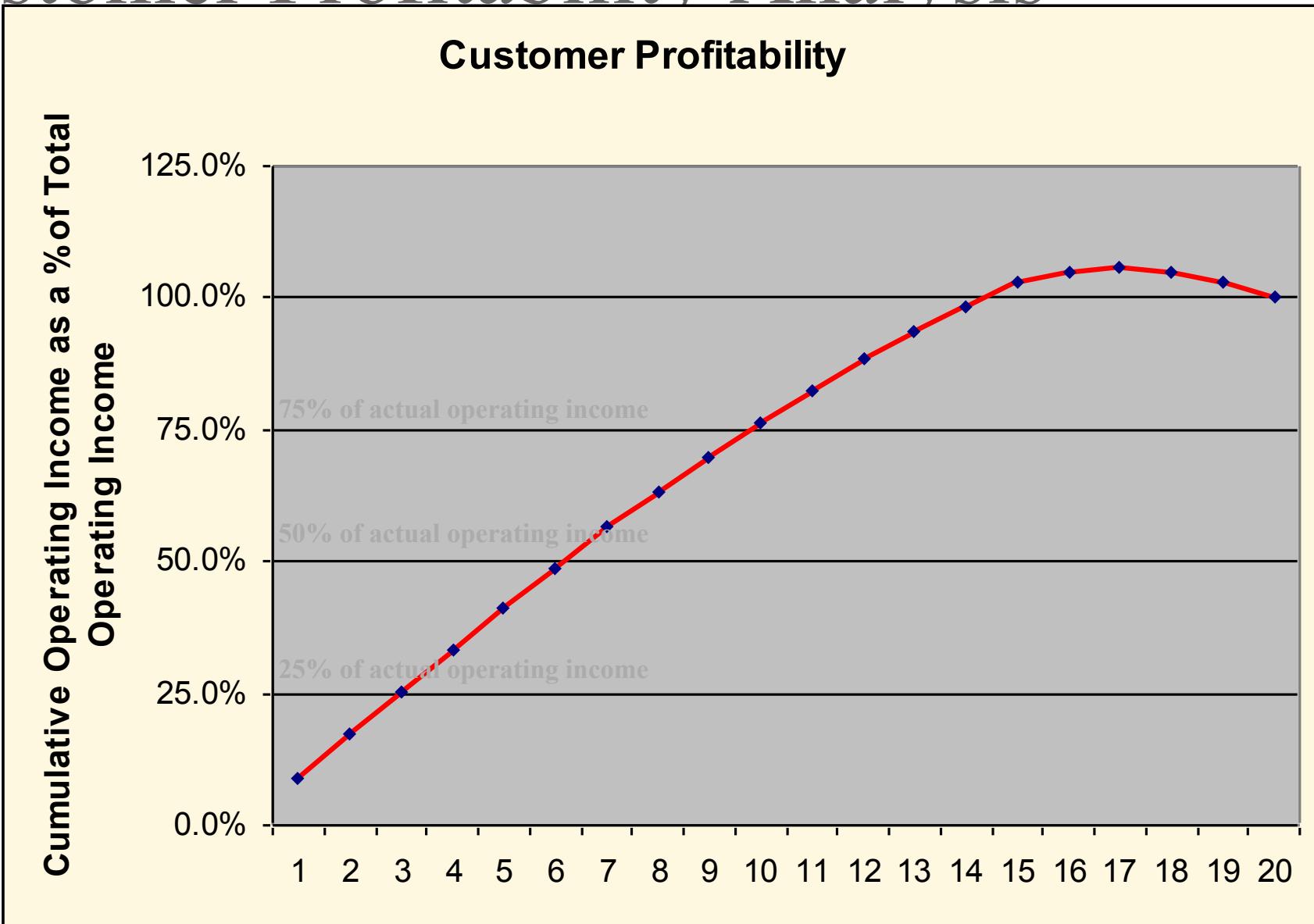
# Customer Profitability Analysis

Customer-Related Activities	Cost Driver Base	Cost Drive Rate
Order processing	Purchase orders	\$ 150
Sales contacts (phone calls, faxes, etc.)	Contacts	100
Sales visits	Visits	1,000
Shipment processing	Shipments	200
Billing and collection	Invoices	160
Design/engineering change orders	Design changes	4,000
Special packaging	Units packaged	40
Special handling	Units handled	60

A company may use these customer related costs to help determine the profitability of each customer.



# Customer Profitability Analysis



# Learning Objective 10

# End of Chapter 5



