

University of Rome

 Tor Vergata

DEPT. MANAGEMENT & LAW
 BACHELOR DEGREE IN BUSINESS ADMINISTRATION

COURSE of Managerial Accounting
- Basics of Cost Analysis -

**Cost Accumulation,
 Tracing, and Allocation**

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Purposes of Cost Allocation



A. Provide Information for Decision Making

B. Reduce Frivolous Use of Common Resources

C. Encourage Evaluation of Services

D. Provide “Full” Cost Information

Managers must have reliable cost estimates to:

- Price products.
- Evaluate performance.
- Control operations.
- Prepare financial statements.

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A. To Provide Information for Decision Making



From a decision making standpoint, the allocated cost should measure the opportunity cost of using a company resource.

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B. To Reduce Frivolous Use of Common Costs

By not allocating costs, resources may appear “free” to users. However, resources never come with zero costs.



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C. To Encourage Evaluation of Services



Users of services should consider the possibility of lower cost alternative. This is unlikely to be considered if costs are not allocated to the user.

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D. To Provide “Full” Cost Information

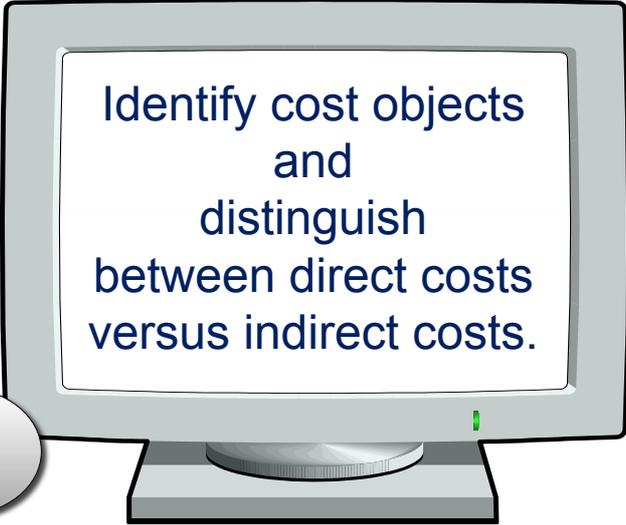
- ❖ **GAAP requires full-costing for external reporting purposes.**
- ❖ **In the long run, all costs must be covered.**



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Learning Objective



Identify cost objects
and
distinguish
between direct costs
versus indirect costs.



LO1

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The Steps of Cost Allocation

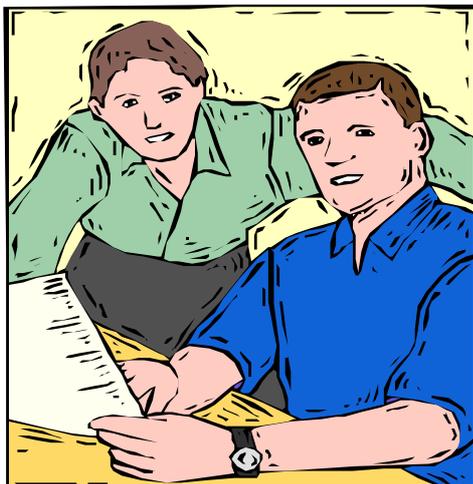


- 1. Determine the Cost Objective (Cost Object)**
- 2. Form Cost Pools**
- 3. Select an Allocation Base to Relate the Cost Pools to Cost Objects**

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1. Identifying the Cost Objective (Cost Object)



Determine the product, service, department, etc., that is to receive the allocation.



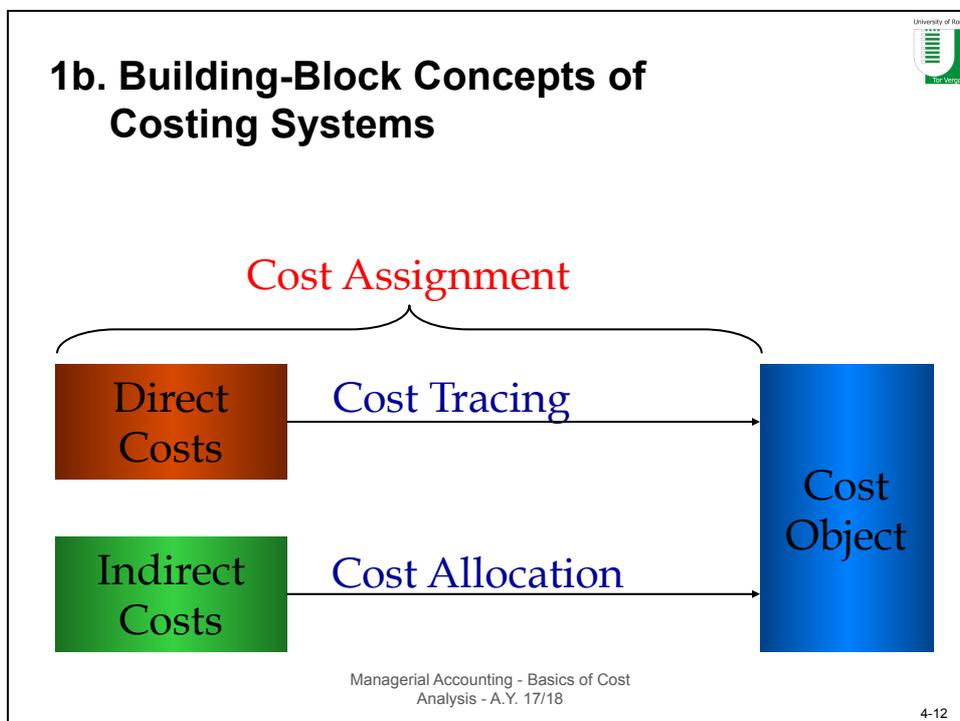
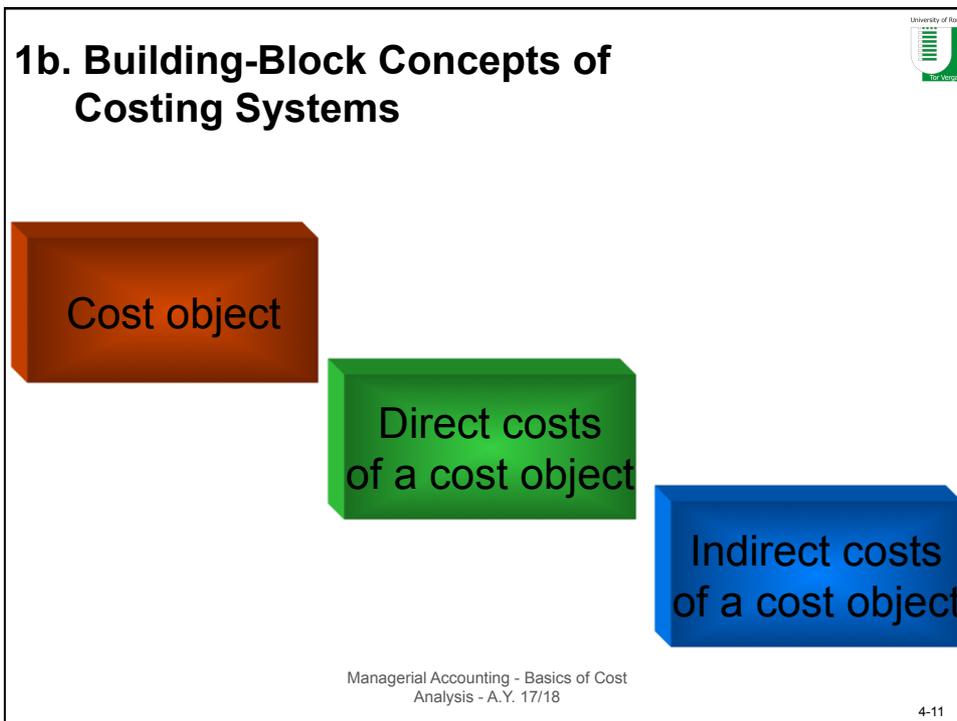
1a. Determine the Cost of Cost Objects

A cost object is any activity, product, or service to which accountants wish to trace costs.

Cost accumulation begins with identifying:

1. Cost objects
2. Cost drivers





2. Form Cost Pools



A cost pool is a grouping of individual costs, the sum of which is allocated using a single allocation base.

Cost pools include:

- ❖ **Departments (i.e., maintenance or personnel departments)**
- ❖ **Major Activities (i.e., equipment setups)**

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2a. Building-Block Concepts of Costing Systems



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2b. Use of Cost Drivers to Accumulate Costs

Accumulated Cost = Minutes Talked × Rate per Minute

Minutes talked is the cost driver.

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3a. Use of Cost Drivers to Accumulate Costs

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3. Select an Allocation Base to Relate the Cost Pools to Cost Objects

- ❖ It is very important that the allocation base relates the cost pool to the cost object.
- ❖ Allocation should be based on a cause and effect relationship between costs and cost objects.
- ❖ If cause and effect cannot be established, other approaches are used.

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Traditional Costing Systems: FOCUS on DIRECT LABOR HOURS

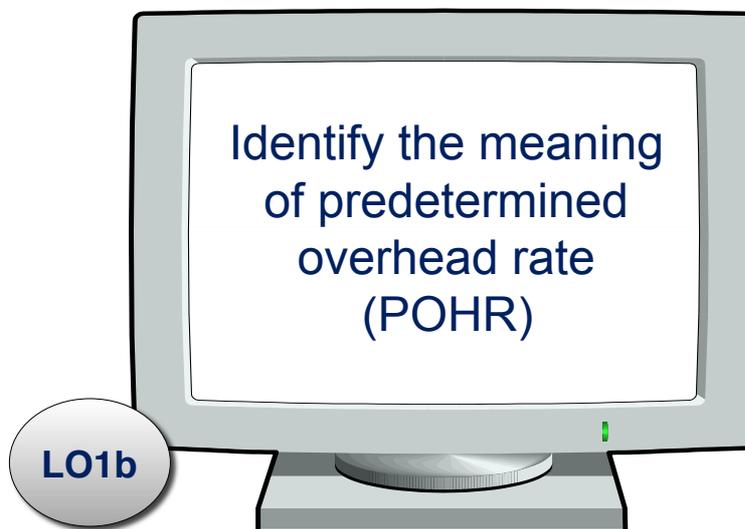
When overhead cost allocation systems were first developed, direct labor made up a large part of total manufacturing cost. It was widely accepted that there was a high correlation between direct labor and the incurrence of overhead cost. As a result, direct labor became the most popular basis for overhead allocation.

- A simplified (one-stage) traditional costing system relying on direct labor to assign overhead is displayed below:



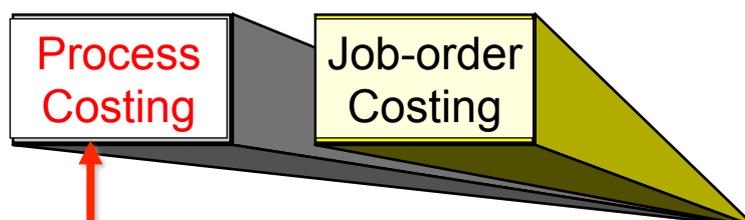
4-18

Learning Objective



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Types of Product Costing Systems

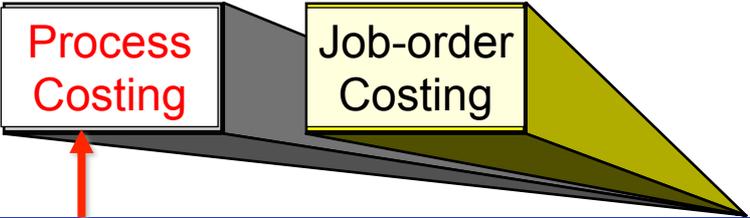


- ❖ A company produces many units of a single product.
- ❖ One unit of product is indistinguishable from other units of product.
- ❖ The identical nature of each unit of product enables assigning the same average cost per unit.

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Types of Product Costing Systems



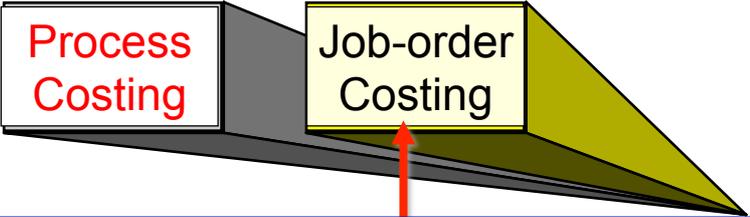
- ❖ A company produces many units of a single
- Example companies:**
- ❖ 1. Weyerhaeuser (paper manufacturing)
- ❖ 2. Reynolds Aluminum (refining aluminum ingots)
- ❖ 3. Coca-Cola (mixing and bottling beverages)

assigning the same average cost per unit.

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Types of Product Costing Systems



- ❖ Many different products are produced each period.
- ❖ Products are manufactured to order.
- ❖ The unique nature of each order requires tracing or allocating costs to each job, and maintaining cost records for each job.

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Types of Product Costing Systems



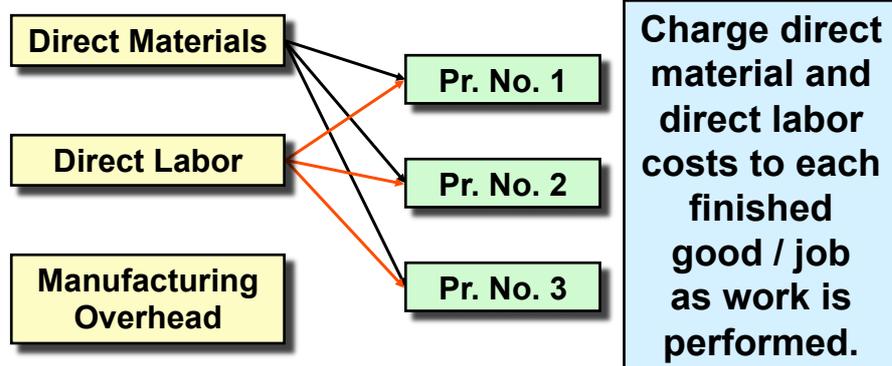
Example companies:

1. Boeing (aircraft manufacturing)
2. Bechtel International (large scale construction)
3. Walt Disney Studios (movie production)

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Cost tracing and allocation – An Overview



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Problem of Manufacturing Overhead

The diagram illustrates the flow of costs from production to products. On the left, three yellow boxes represent 'Direct Materials', 'Direct Labor', and 'Manufacturing Overhead'. On the right, three green boxes represent 'Pr. No. 1', 'Pr. No. 2', and 'Pr. No. 3'. Green arrows show 'Direct Materials' and 'Direct Labor' being traced to each of the three products. A single green arrow shows 'Manufacturing Overhead' being allocated to all three products.

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Manufacturing Overhead, including *indirect materials* and *indirect labor*, are allocated to all goods / jobs rather than directly traced to each finish good / job.

Why Use an Allocation Base?

Manufacturing overhead is applied to product lines / jobs that are in process. An allocation base, such as direct labor hours, direct labor dollars, or machine hours, is used to assign manufacturing overhead to individual jobs.

We use an allocation base because:

1. It is impossible or difficult to trace overhead costs to particular products or jobs.
2. Manufacturing overhead consists of many different items ranging from the grease used in machines to production manager's salary.
3. Many types of manufacturing overhead costs are fixed even though output fluctuates during the period.

4-26

Manufacturing Overhead Application



The predetermined overhead rate (**POHR**) used to apply overhead to each product lines is determined before the period begins.

$$\text{POHR} = \frac{\text{Estimated total manufacturing overhead cost for the coming period}}{\text{Estimated total units in the allocation base for the coming period}}$$

Ideally, the allocation base is a cost driver that causes overhead.

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The Need for a POHR



Using a predetermined rate makes it possible to estimate total job costs sooner.



Actual overhead for the period is not known until the end of the period.

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Application of Manufacturing Overhead



Based on *estimates*, and determined before the period begins.



$$\text{Overhead applied} = \text{POHR} \times \text{Actual activity}$$

Actual amount of the allocation based upon the actual level of activity.

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Overhead Application Rate



$$\text{POHR} = \frac{\text{Estimated total manufacturing overhead cost for the coming period}}{\text{Estimated total units in the allocation base for the coming period}}$$

$$\text{POHR} = \frac{\$640,000}{160,000 \text{ direct labor hours (DLH)}}$$

$$\text{POHR} = \$4.00 \text{ per DLH}$$

For each direct labor hour worked on a particular job, \$4.00 of factory overhead will be applied to that job.



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Learning Objective



Trace direct cost
and Allocate
indirect costs
to cost objects.

LO2

4-31

Identifying Direct and Indirect Costs



In Style, Inc. Department Store pays a bonus to each department manager based on a percentage of departmental sales. The incentive has increased departmental sales, but departmental profits have not increased accordingly.

Management has decided to base future bonuses on department profitability.

Sales

Department			
Women's	Men's	Children's	Total
\$ 190,000	\$ 110,000	\$ 60,000	\$ 360,000

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Identifying Direct and Indirect Costs

The first step in the development of the new bonus strategy is to determine the costs of each department.

Costs that **can** be traced to departments in a *cost-effective* manner are called **direct costs**.

Costs that **cannot** be traced to departments in a *cost-effective* manner are called **indirect costs**.

	Department			
	Women's	Men's	Children's	Total
Sales	\$ 190,000	\$ 110,000	\$ 60,000	\$ 360,000

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Identifying Direct and Indirect Costs

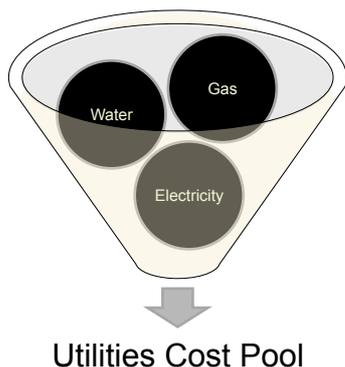
	Department			
	Women's	Men's	Children's	Indirect Costs
Direct Costs:				
Cost of Goods Sold	\$ 120,000	\$ 58,000	\$ 38,000	
Sales Commissions	9,500	5,500	3,000	
Supervisors' Salary	5,000	4,200	2,800	
Depreciation	7,000	5,000	4,000	
Indirect Costs:				
Store Manager Salary				\$ 9,360
Store Rental				18,400
Utilities				2,300
Advertising				7,200
Supplies				900
Totals	\$ 141,500	\$ 72,700	\$ 47,800	\$ 38,160

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Aggregating and Disaggregating Individual Costs into Cost Pools



Frequently, companies accumulate many individual costs into a single cost pool.

Pooling should be limited to costs with common cost drivers.



Learning Objective

Identify the most appropriate cost driver for indirect cost allocation

LO3

Selecting the Best Cost Driver

Judgment and reasoning are necessary.

Considerations

Relationship between cost driver activity and use of resources.

Availability of information.

So which volume measure should I use?



Remember you have two main different cost objects:

- 1) Department**
- 2) Product lines / Products**

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1) Allocating Indirect Costs to Departments

Identify the most appropriate cost driver for each indirect cost.

Indirect costs should be allocated to reflect how the departments consume resources.

The cost drivers of In Style, Inc. are:



Indirect Costs		
Store Manager Salary		\$ 9,360
Store Rental		18,400
Utilities		2,300
Advertising		7,200
Supplies		900

4-38



1) Allocating Indirect Costs to Departments

Use a two-step process to allocate indirect costs:

- ① Allocation rate = total cost ÷ cost driver activity.
- ② Allocated cost = allocation rate × weight of the cost driver activity.

Store Manager Salary	Equal Portion	\$ 9,360
Store Rental	Floor Space Occupied	18,400
Utilities	Floor Space Occupied	2,300
Advertising	Sales Volume	7,200
Supplies	Sales Volume	900

4-39



1) Allocating Indirect Costs to Departments

- ① $\$9,360 \div 3 \text{ departments} = \$3,120 \text{ per department}$
- ② $\$3,120 \times 1 \text{ department} = \$3,120$

Indirect Costs	Department			Total
	Women's	Men's	Children's	
Store Manager Salary				\$ 9,360
Store Rental				18,400
Utilities				2,300
Advertising				7,200
Supplies				900

4-40

1) Allocating Indirect Costs to Departments



① $\$18,400 \div 23,000$ square feet = $\$0.80$ per square foot

② $\$0.80 \times 12,000$ Women's square feet = **$\$9,600$**

$\$0.80 \times 7,000$ Men's square feet = **$\$5,600$**

$\$0.80 \times 4,000$ Children's square feet = **$\$3,200$**

Indirect Costs	Department			
	Women's	Men's	Children's	Total
Store Manager Salary	\$ 3,120	\$ 3,120	\$ 3,120	\$ 9,360
Store Rental				18,400
Utilities				2,300
Advertising				7,200
Supplies				900

4-41

1) Allocating Indirect Costs to Departments



① $\$2,300 \div 23,000$ square feet = $\$0.10$ per square foot

② $\$0.10 \times 12,000$ Women's square feet = **$\$1,200$**

$\$0.10 \times 7,000$ Men's square feet = **$\$700$**

$\$0.10 \times 4,000$ Children's square feet = **$\$400$**

Indirect Costs	Department			
	Women's	Men's	Children's	Total
Store Manager Salary	\$ 3,120	\$ 3,120	\$ 3,120	\$ 9,360
Store Rental	9,600	5,600	3,200	18,400
Utilities				2,300
Advertising				7,200
Supplies				900

4-42



1) Allocating Indirect Costs to Departments

① $\$7,200 \div \$360,000 \text{ sales} = \$0.02 \text{ per sales dollar}$

② $\$0.02 \times \$190,000 \text{ Women's sales} = \$3,800$

$\$0.02 \times \$110,000 \text{ Men's sales} = \$2,200$

$\$0.02 \times \$60,000 \text{ Children's sales} = \$1,200$

Indirect Costs	Department			
	Women's	Men's	Children's	Total
Store Manager Salary	\$ 3,120	\$ 3,120	\$ 3,120	\$ 9,360
Store Rental	9,600	5,600	3,200	18,400
Utilities	1,200	700	400	2,300
Advertising				7,200
Supplies				900

4-43



1) Allocating Indirect Costs to Departments

① $\$900 \div \$360,000 \text{ sales} = \$0.0025 \text{ per sales dollar}$

② $\$0.0025 \times \$190,000 \text{ Women's sales} = \475

$\$0.0025 \times \$110,000 \text{ Men's sales} = \275

$\$0.0025 \times \$60,000 \text{ Children's sales} = \150

Indirect Costs	Department			
	Women's	Men's	Children's	Total
Store Manager Salary	\$ 3,120	\$ 3,120	\$ 3,120	\$ 9,360
Store Rental	9,600	5,600	3,200	18,400
Utilities	1,200	700	400	2,300
Advertising	3,800	2,200	1,200	7,200
Supplies				900

4-44

1) Allocating Indirect Costs to Departments



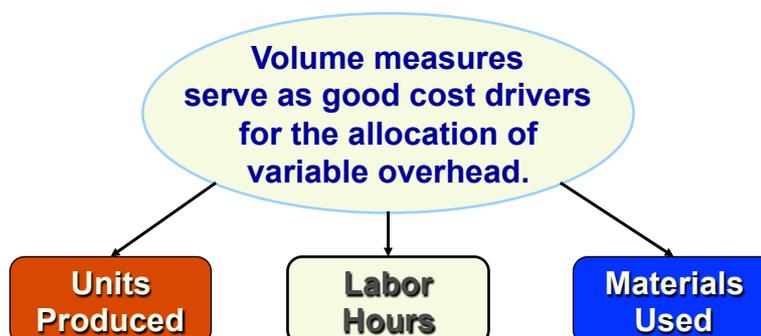
	Department			
	Women's	Men's	Children's	Total
Sales	\$ 190,000	\$ 110,000	\$ 60,000	\$ 360,000
Direct Costs				
Cost of Goods Sold	120,000	58,000	38,000	216,000
Sales Commissions	9,500	5,500	3,000	18,000
Supervisors' Salary	5,000	4,200	2,800	12,000
Depreciation	7,000	5,000	4,000	16,000
Indirect costs				
Store Manager Salary	3,120	3,120	3,120	9,360
Store Rental	9,600	5,600	3,200	18,400
Utilities	1,200	700	400	2,300
Advertising	3,800	2,200	1,200	7,200
Supplies	475	275	150	900
Departmental Profit	\$ 30,305	\$ 25,405	\$ 4,130	\$ 59,840

4-45

2) Using Volume Measures to Allocate Variable Overhead Costs to Products



Increases in the volume of production will cause variable overhead costs to increase.



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2) Using Volume Measures to Allocate Variable Overhead Costs to Products



	Product		
	Chairs	Desks	Total
Units of Production	4,000	1,000	5,000
Direct Labor Hours	2,500	3,500	6,000
Direct Materials Cost	\$ 500,000	\$ 1,000,000	\$ 1,500,000
Indirect Materials Cost			\$ 60,000

Filmier Furniture Company Production and Cost Information

Use the two-step process to allocate indirect materials cost using the three volume measures as cost drivers.

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2) Using Volume Measures to Allocate Variable Overhead Costs to Products



① $\$60,000 \div 5,000 \text{ units} = \12 per unit

② $\$12 \text{ per unit} \times 4,000 \text{ chairs} = \$48,000$

$\$12 \text{ per unit} \times 1,000 \text{ desks} = \$12,000$

Indirect Materials Cost	Chairs	Desks	\$ 60,000
Allocation of Indirect Materials Cost Based on:			
Units of Production	<input type="text"/>	<input type="text"/>	\$ 60,000
Direct Labor Hours	<input type="text"/>	<input type="text"/>	
Direct Materials Cost	<input type="text"/>	<input type="text"/>	

4-48

2) Using Volume Measures to Allocate Variable Overhead Costs to Products



① $\$60,000 \div 6,000 \text{ hours} = \10 per hour

② $\$10 \text{ per hour} \times 2,500 \text{ hours} = \$25,000$

$\$10 \text{ per hour} \times 3,500 \text{ hours} = \$35,000$

Indirect Materials Cost	Chairs	Desks	\$ 60,000
Allocation of Indirect Materials Cost Based on:			
Units of Production	\$ 48,000	\$ 12,000	\$ 60,000
Direct Labor Hours			60,000
Direct Materials Cost			

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2) Using Volume Measures to Allocate Variable Overhead Costs to Products



① $\$60,000 \div \$1,500,000 \text{ of direct material} = \$0.04 \text{ per dollar of direct material}$

② $\$0.04 \text{ per } \$ \times \$500,000 = \$20,000$

$\$0.04 \text{ per } \$ \times \$1,000,000 = \$40,000$

Indirect Materials Cost	Chairs	Desks	\$ 60,000
Allocation of Indirect Materials Cost Based on:			
Units of Production	\$ 48,000	\$ 12,000	\$ 60,000
Direct Labor Hours	25,000	35,000	60,000
Direct Materials Cost			60,000

4-50

3) Allocating Fixed Overhead Costs to Products



Objective

Distribute a fair share of the overhead cost to each product.

There are no volume based cost drivers for fixed overhead.

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3) Allocating Fixed Overhead Costs to Products



Lednicky Bottling Company Information

Units Produced	2,000,000
Units Sold	1,800,000
Units in Ending Inventory	200,000
Fixed Rental Cost	\$ 28,000

Use the two-step process to allocate the fixed rental cost to units sold and to units in ending inventory.

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3) Allocating Fixed Overhead Costs to Products



Units Produced	2,000,000
Units Sold	1,800,000
Units in Ending Inventory	200,000
Fixed Rental Cost	\$ 28,000

① $\$28,000 \div 2,000,000 \text{ units} = \0.014 per unit

② $\$0.014 \text{ per unit} \times 1,800,000 \text{ units} = \$25,200$

$\$0.014 \text{ per unit} \times 200,000 \text{ units} = \$2,800$

4-53

Exercise D.P. 4-1: My House/ Your House



	House 1	House 2	House 3
Direct Materials	\$140,000	\$ 70,000	\$90,000
Direct Labor	210,000	130,000	60,000
Overhead*	?	?	?

*The building contractor's total indirect costs (such as supervisory salaries and indirect materials) amount to \$84,000.

My new house is house number one. I believe distributing the contractor's overhead costs equally among the three houses is a fair way to allocate them. My specific recommendation is:

\$84,000 overhead / 3 houses = \$28,000 per house. Your new house is house number three. Do you agree with this assignment of cost?

Exercise D.P. 4-1: My House/ Your House



Assume a builder is building three houses simultaneously. The direct materials and direct labor costs for each house are those shown in the previous slide. The total indirect costs (such as supervisory salaries and indirect materials) are \$84,000.

Required

- Assume the builder allocates overhead (indirect) costs equally among the three houses. Determine the amount of overhead cost allocated to each house. Comment on whether this allocation scheme is reasonable. Explain why it may be inappropriate to use number of units as the allocation base.
- Assume instead that the builder allocates overhead costs based on total direct costs. Determine the amount of overhead cost allocated to each house. Compare the allocations determined in **requirement a** with the allocations determined in **requirement b**. Identify who will benefit and who will suffer if the builder uses the **requirement b** allocation method instead of allocating overhead equally.
- Assume that the \$84,000 of total overhead cost consists of \$63,000 of indirect materials and \$21,000 of fringe benefits. Decide what you believe is the most rational allocation scheme and use that scheme to allocate the overhead cost to the three houses.

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Learning Objective



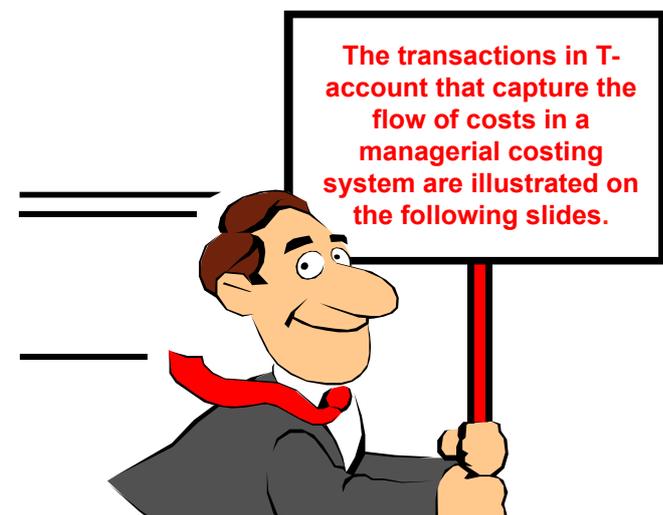

Identify and manage
Overapplied and
Underapplied
Overhead costs

LO3b

4-56

The Flow of Costs





The transactions in T-account that capture the flow of costs in a managerial costing system are illustrated on the following slides.

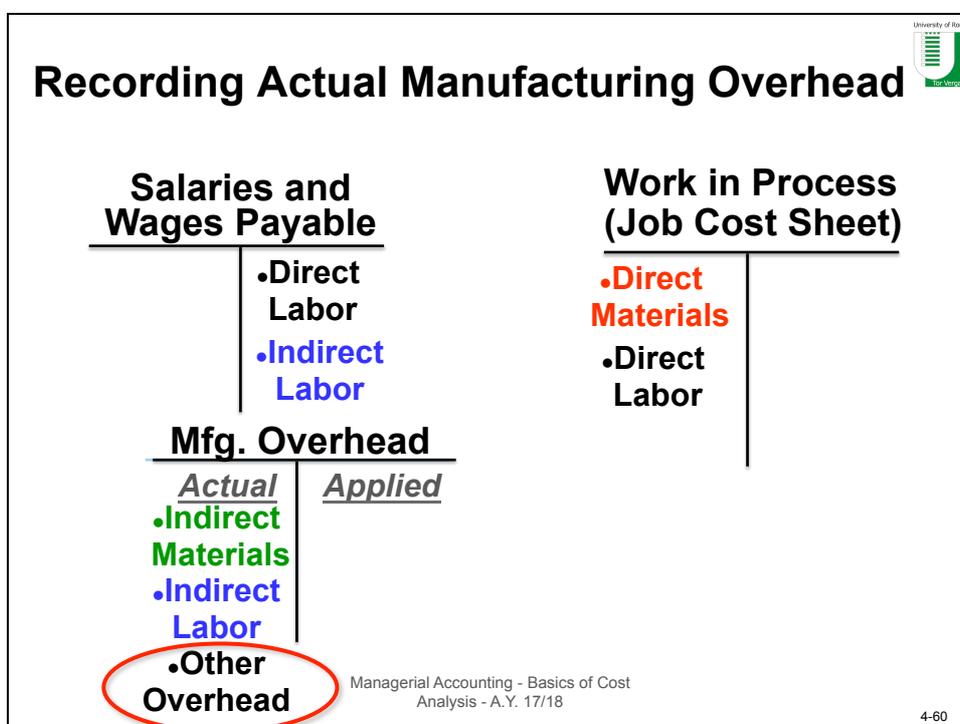
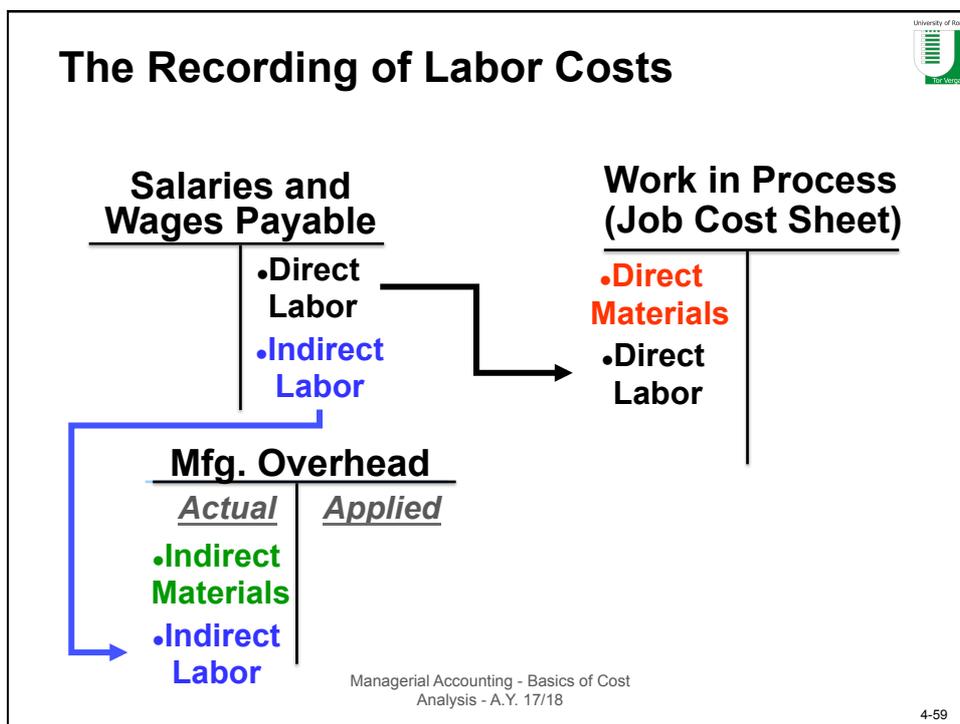
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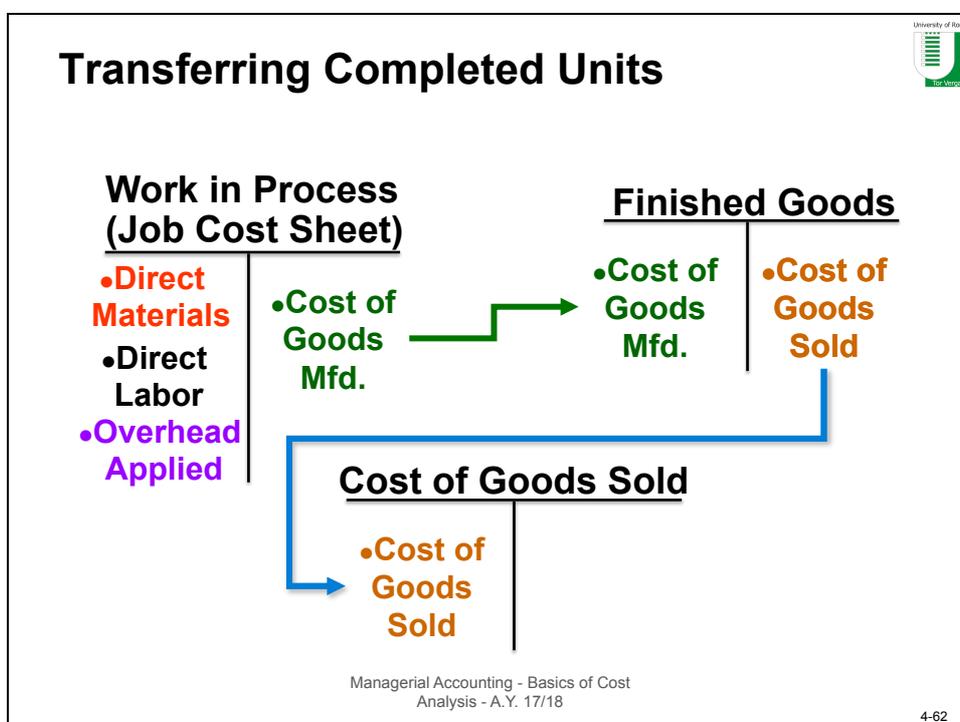
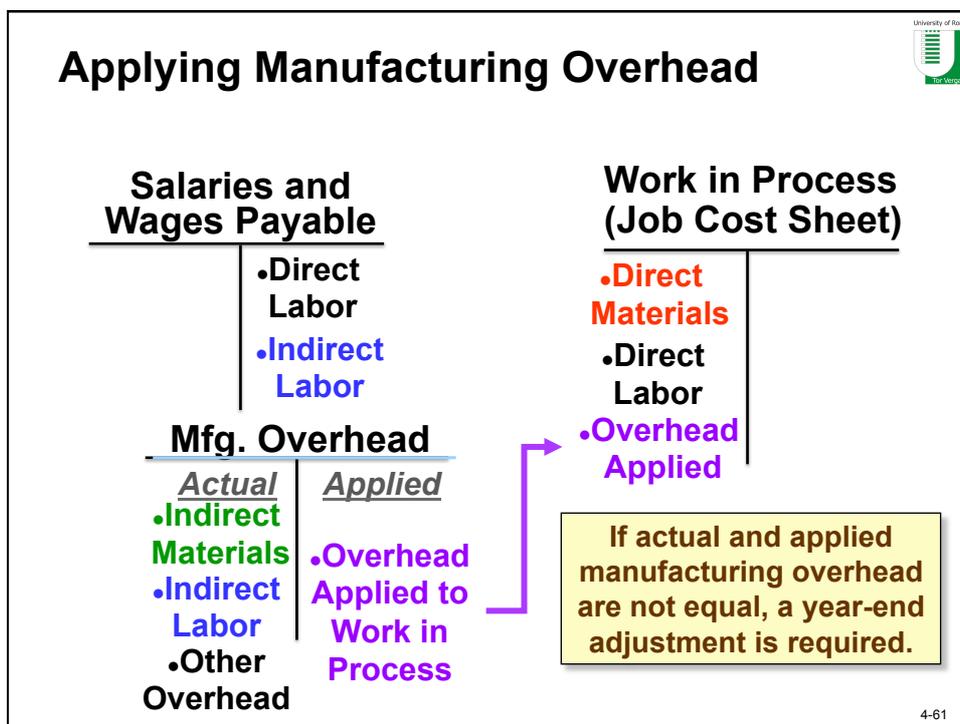
The Purchase and Issue of Raw Materials

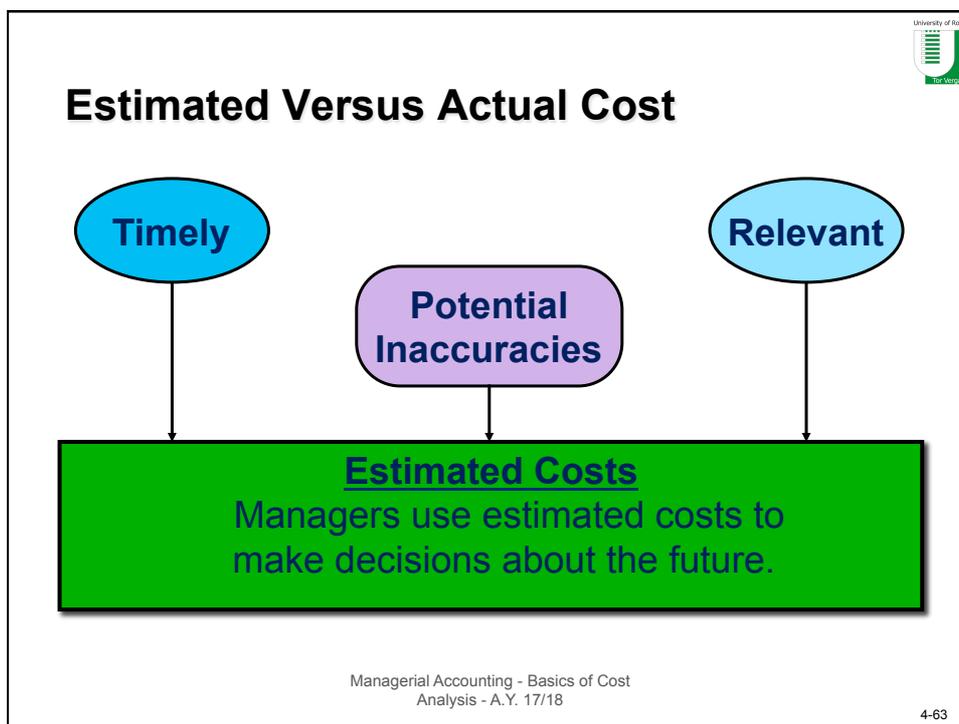


<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Raw Materials</th></tr> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> •Material Purchases </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> •Direct Materials •Indirect Materials </td> </tr> </table>	Raw Materials		<ul style="list-style-type: none"> •Material Purchases 	<ul style="list-style-type: none"> •Direct Materials •Indirect Materials 		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Work in Process (Job Cost Sheet)</th></tr> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> •Direct Materials </td> <td style="width: 50%;"></td> </tr> </table>	Work in Process (Job Cost Sheet)		<ul style="list-style-type: none"> •Direct Materials 	
Raw Materials										
<ul style="list-style-type: none"> •Material Purchases 	<ul style="list-style-type: none"> •Direct Materials •Indirect Materials 									
Work in Process (Job Cost Sheet)										
<ul style="list-style-type: none"> •Direct Materials 										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Mfg. Overhead</th></tr> <tr> <td style="width: 50%; text-align: center;"><u>Actual</u></td> <td style="width: 50%; text-align: center;"><u>Applied</u></td> </tr> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> •Indirect Materials </td> <td></td> </tr> </table>	Mfg. Overhead		<u>Actual</u>	<u>Applied</u>	<ul style="list-style-type: none"> •Indirect Materials 					
Mfg. Overhead										
<u>Actual</u>	<u>Applied</u>									
<ul style="list-style-type: none"> •Indirect Materials 										

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Allocating Costs to Solve Timing Problems

Allocating fixed costs can be complicated when the volume of production varies from month to month.

	January	February
Supervisor's Salary	\$ 3,000	\$ 3,000
Units Produced	800	1,875
Salary Cost per Unit Produced	\$ 3.75	\$ 1.60

If prices are based on these costs, units produced in January will be priced higher than those produced in February.

Will customers think this is reasonable?

4-64



Allocating Costs to Solve Timing Problems

We solve this problem by using estimated costs and estimated production for the year to obtain a **predetermined overhead rate (POHR)**.

$$\text{POHR} = \frac{\text{Estimated overhead for the year}}{\text{Estimated allocation base for the year}}$$

$$\text{POHR} = \frac{\$36,000}{18,000 \text{ units}} = \$2.00 \text{ per unit}$$

\$2.00 allocated to each unit produced for all months during the year.

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4-65



Problems of Overhead Application

The difference between the overhead cost applied to Work in Process and the actual overhead costs of a period is referred to as either underapplied or overapplied overhead.

Underapplied overhead exists when the amount of overhead applied to jobs/product lines during the period using the predetermined overhead rate is ***less than*** the total amount of overhead actually incurred during the period.

Overapplied overhead exists when the amount of overhead applied to jobs/product lines during the period using the predetermined overhead rate is ***greater than*** the total amount of overhead actually incurred during the period.

-66

Overapplied and Underapplied Manufacturing Overhead



If Manufacturing Overhead is . . .	<u>Alternative 1</u> Close to Cost of Goods Sold	<u>Alternative 2</u> Allocation
UNDERAPPLIED (Applied OH is less than actual OH)	INCREASE Cost of Goods Sold	INCREASE Work in Process Finished Goods Cost of Goods Sold
OVERAPPLIED (Applied OH is greater than actual OH)	DECREASE Cost of Goods Sold	DECREASE Work in Process Finished Goods Cost of Goods Sold

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4-67

Learning Objective



Allocate joint costs
to joint products

LO4

4-68

Allocating Joint Costs

Joint products – products resulting from a process with a common input.

Split-off point – the stage of processing where joint products are separated.

Joint costs – costs of processing joint products prior to the split-off point.

4-69

Allocating Joint Costs

Joint Costs

Joint Materials: \$27,000

Joint Processing: \$21,000

Split-Off Point

Compound AK \$36,000	3,000 gal.		Sales \$50,000
			COGS <u>(36,000)</u>
			GM \$14,000
Compound AL \$12,000	1,000 gal.	Additional Processing \$8,000	Sales \$13,000
			COGS <u>(20,000)</u>
			GM (\$7,000)

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4-70



Relative Sales Value Method

		With Compound AL	Without Compound AL
Sales	\$63,000	(\$50,000 + \$13,000)	\$50,000
Cost of goods sold	<u>(56,000)</u>	(\$36,000 + \$20,000)	<u>(48,000)</u>
Gross margin	<u>\$ 7,000</u>		<u>\$ 2,000</u>

	Compound AK	Compound AL
Sales	\$50,000	\$13,000
Cost of goods sold	<u>(48,000)</u>	<u>(8,000)</u>
Gross margin	<u>\$ 2,000</u>	<u>\$ 5,000</u>

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4-71

Learning Objective



Recognize the effects
of cost allocation
on employee
motivation.

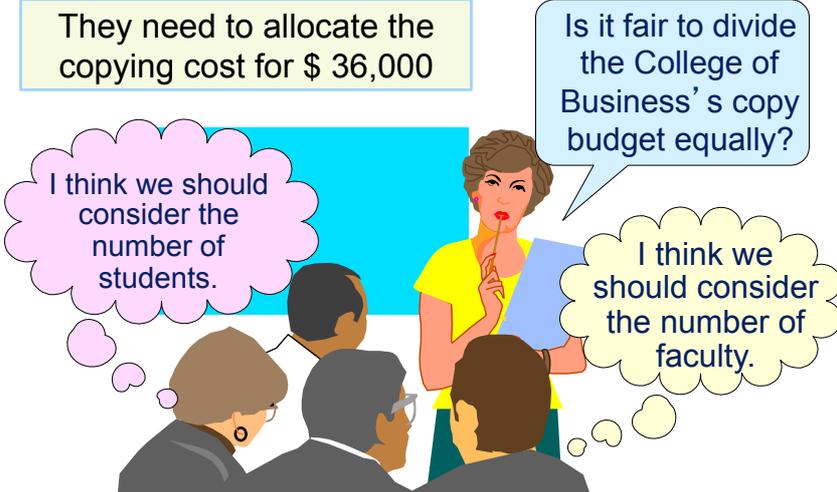
LO5

4-72



Cost Allocation: The Human Factor

They need to allocate the copying cost for \$ 36,000



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Cost Allocation: The Human Factor

Academic Departments	Number of Faculty	Number of Students	Actual Cost Prior Year
Management	29	330	\$ 12,000
Accounting	16	360	10,000
Finance	12	290	8,000
Marketing	15	220	6,000
Totals	72	1,200	36,000

Let's see how the allocation of budgeted amounts will effect the different departments.
We will begin by allocating based on the number of faculty in each department.

4-74



① $\$36,000 \div 72 \text{ faculty} = \$500 \text{ per faculty member}$

② $\$500 \times 29 \text{ faculty members} = \$14,500$

$\$500 \times 16 \text{ faculty members} = \$8,000$

$\$500 \times 16 \text{ faculty members} = \$8,000$

$\$500 \times 16 \text{ faculty members} = \$8,000$

Now let's allocate the \$36,000 budget based on the number of students in each department.

Acad Depart	Actual Cost	Allocation	Difference
Manag	12,000	9,500	\$ 2,500
Accou	10,000	12,000	(2,000)
Financ	8,000	11,000	(2,000)
Marketing	6,000	7,500	1,500
Totals	<u>36,000</u>	<u>36,000</u>	<u>-</u>





4-75



① $\$36,000 \div 1,200 \text{ students} = \30 per student

② $\$30 \text{ per student} \times 330 \text{ students} = \$9,900$

$\$30 \text{ per student} \times 360 \text{ students} = \$10,800$

$\$30 \text{ per student} \times 290 \text{ students} = \$8,700$

$\$30 \text{ per student} \times 220 \text{ students} = \$6,600$

Academic Departments	Actual Cost Prior Year	Allocation	Difference
Management	\$ 12,000	11,900	\$ (2,100)
Accounting	10,000	10,800	800
Finance	8,000	8,700	700
Marketing	6,000	6,600	600
Totals	<u>36,000</u>	<u>36,000</u>	<u>-</u>





4-76

Learning Objective



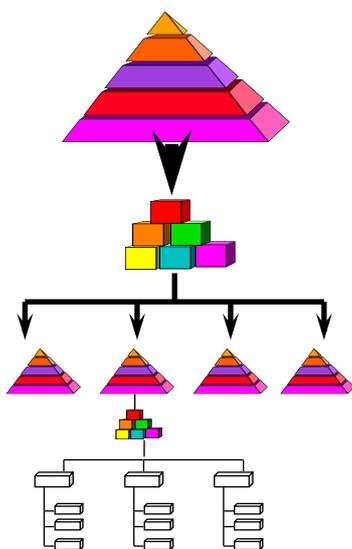
Allocate service department costs to operating departments (Appendix).

LO6

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4-77

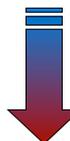
Operating and Service Departments



Organizational Structure



Responsibility Centers



Operating and Service Departments

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4-78



Operating Departments

An operating department carries out the central purpose of the organization

The Accounting Department at your University.



An Assembly Department at General Motors.

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4-79



Service Departments

A service department does not directly engage in operating activities.

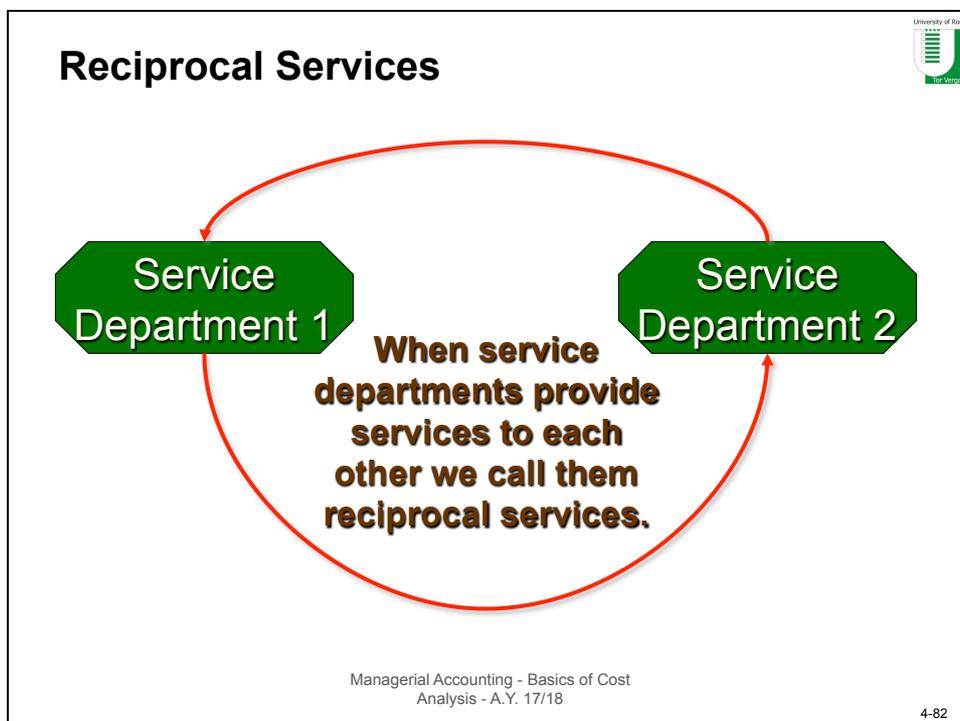
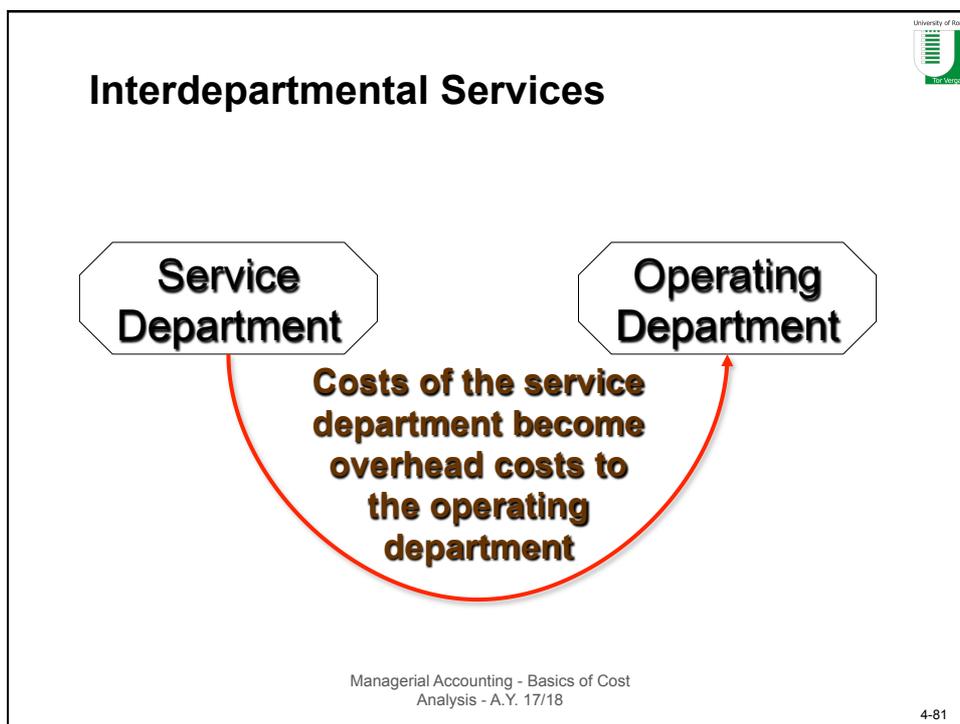
The Accounting Department at Macys

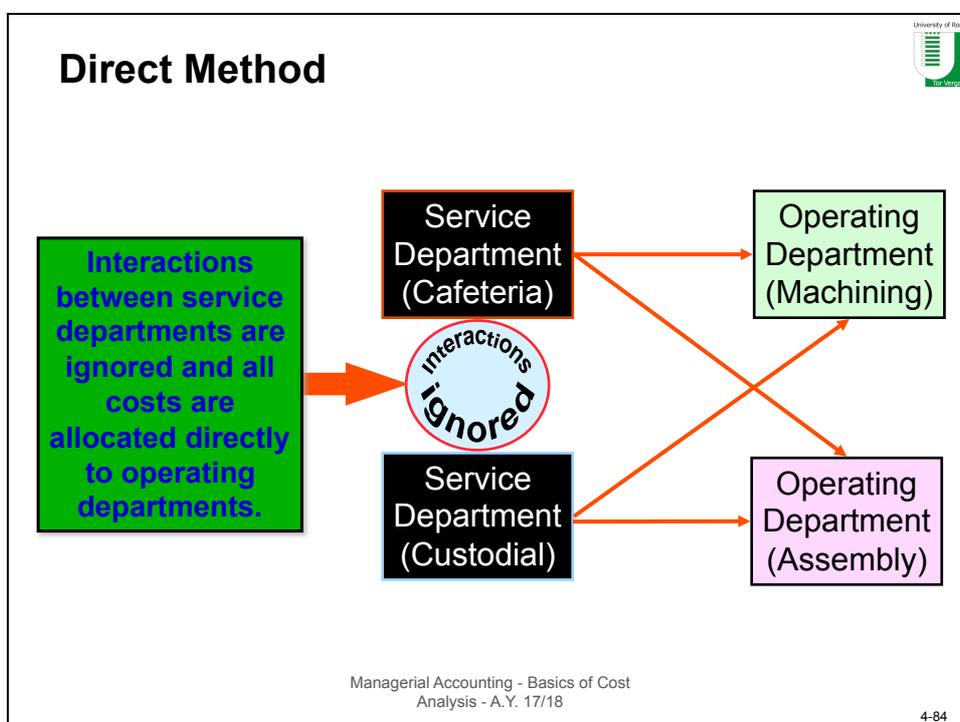
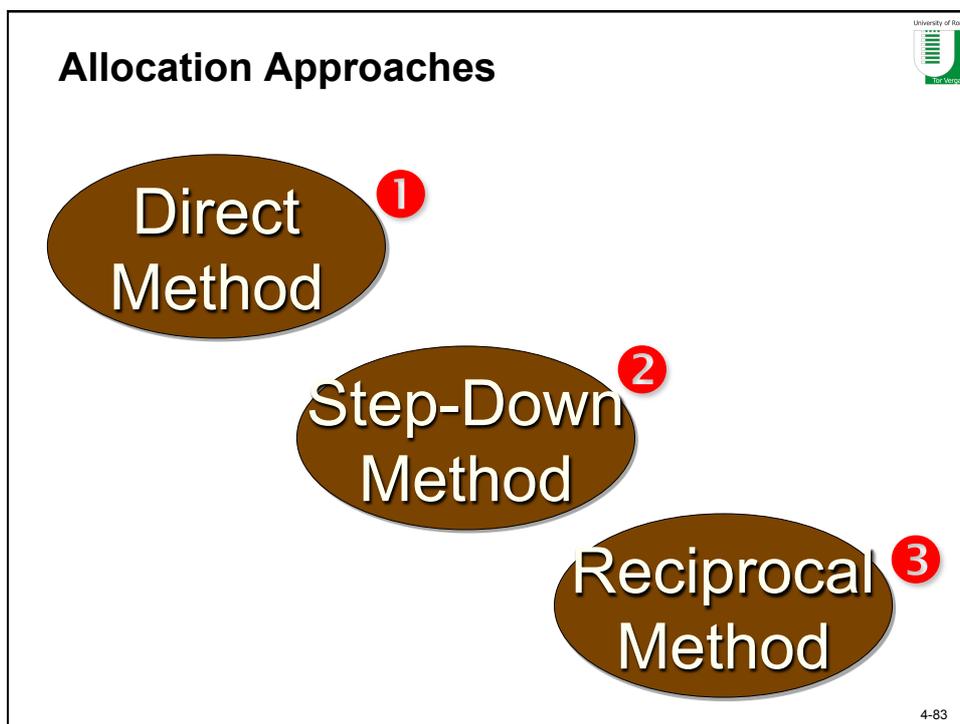


The Human Resources Department at Walgreens.

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4-80





Direct Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Number of employees	15	10	20	30
Square feet occupied	5,000	2,000	25,000	50,000

Service Department	Allocation Base
Cafeteria	Number of employees
Custodial	Square feet occupied

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4-85

Direct Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	?		?	?
Custodial allocation		?	?	?
Total after allocation	?	?	?	?

How much of the Cafeteria and Custodial costs should be allocated to each operating department using the direct method of cost allocation?

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4-86

Direct Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)		144,000	?
Custodial allocation		?	?	?
Total after allocation	\$ 0	?	?	?

$$\$360,000 \times \frac{20}{20 + 30} = \$144,000$$

Allocation base: Number of employees

4-87

Direct Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)		144,000	216,000
Custodial allocation		?	?	?
Total after allocation	\$ 0	?	?	?

$$\$360,000 \times \frac{30}{20 + 30} = \$216,000$$

Allocation base: Number of employees

4-88

Direct Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)		144,000	216,000
Custodial allocation		(90,000)	30,000	?
Total after allocation	\$ 0	\$ 0	\$ 574,000	?

$$\$90,000 \times \frac{25,000}{25,000 + 50,000} = \$30,000$$

Allocation base: Square feet occupied

4-89

Direct Method

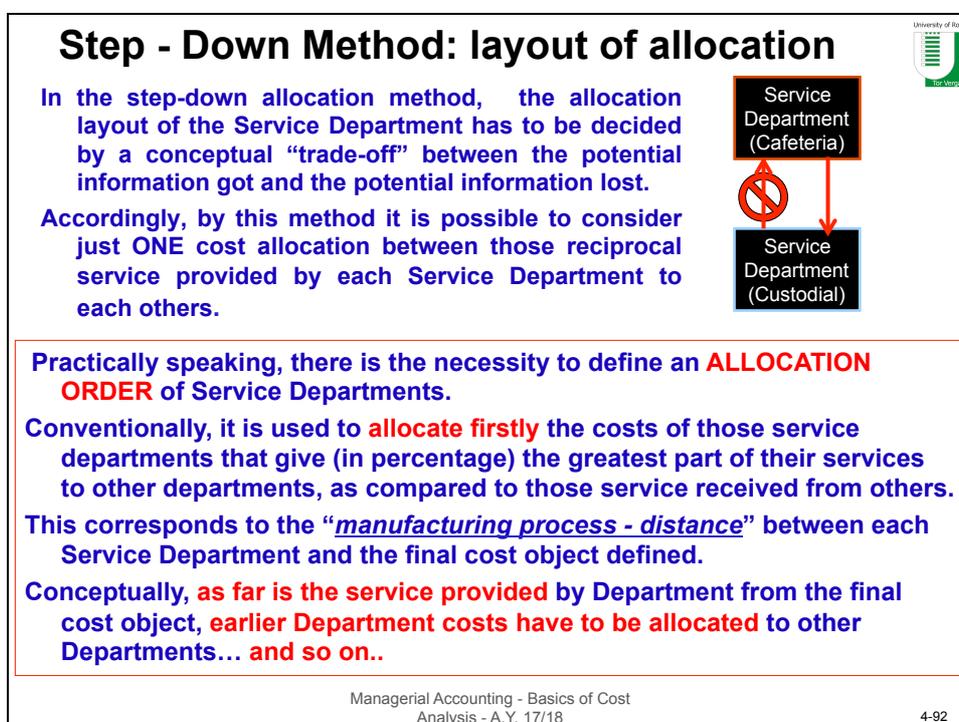
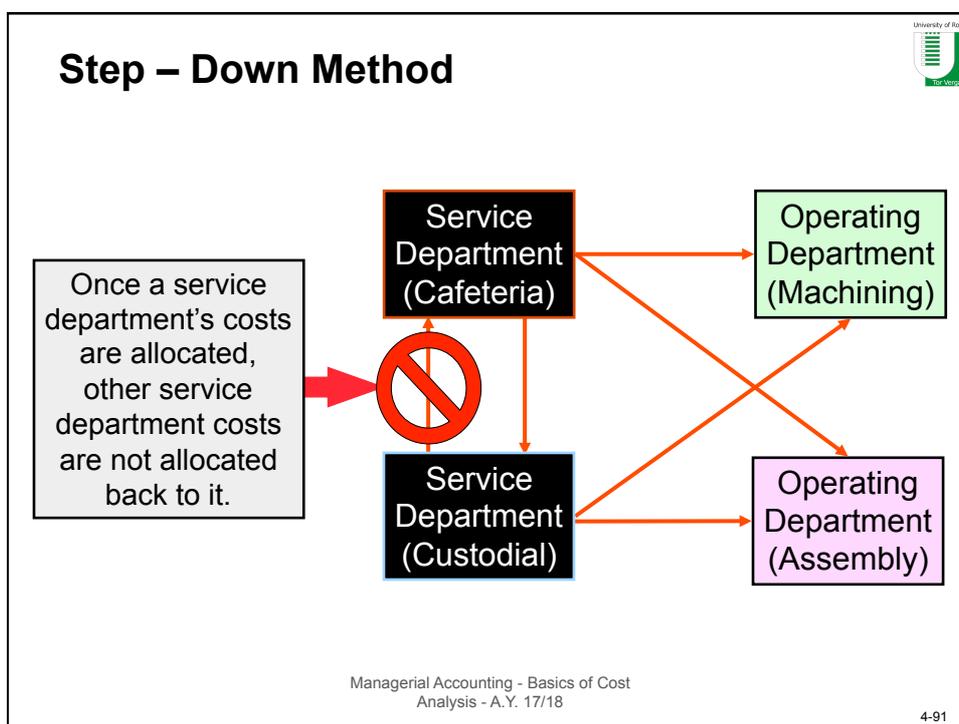


	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)		144,000	216,000
Custodial allocation		(90,000)	30,000	60,000
Total after allocation	\$ 0	\$ 0	\$ 574,000	\$ 976,000

$$\$90,000 \times \frac{50,000}{25,000 + 50,000} = \$60,000$$

Allocation base: Square feet occupied

4-90



Step - Down Method: other observations



There are three key points to understand regarding the step-down method:

- ① In both the direct and step methods, any amount of the allocation base attributable to the service department whose cost is being allocated is always ignored.
- ② Any amount of the allocation base that is attributable to a service department whose cost has already been allocated is ignored.
- ③ Each service department assigns its own costs to operating departments plus the costs that have been allocated to it from other service departments.

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4-93

Step – Down Method



We will use the same data used
in the direct method example.

	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Number of employees	15	10	20	30
Square feet occupied	5,000	2,000	25,000	50,000

Service Department	Allocation Base
Cafeteria	Number of employees
Custodial	Square feet occupied

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4-94

Step – Down Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	?	?	?	?
Custodial allocation		?	?	?
Total after allocation	?	?	?	?

Allocate Cafeteria costs first since it provides more service than Custodial.

Step – Down Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)	60,000	?	?
Custodial allocation		?	?	?
Total after allocation	\$ 0	?	?	?

$$\$360,000 \times \frac{10}{10 + 20 + 30} = \$60,000$$

Allocation base: Number of employees

Step – Down Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)	60,000	120,000	?
Custodial allocation		?	?	?
Total after allocation	\$ 0	?	?	?

$$\$360,000 \times \frac{20}{10 + 20 + 30} = \$120,000$$

Allocation base: Number of employees

Step – Down Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)	60,000	120,000	180,000
Custodial allocation		?	?	?
Total after allocation	\$ 0	?	?	?

$$\$360,000 \times \frac{30}{10 + 20 + 30} = \$180,000$$

Allocation base: Number of employees

Step – Down Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)	60,000	120,000	180,000
Custodial allocation		(150,000)	?	?
Total after allocation	\$ 0	\$ 0	?	?

New total = \$90,000 original Custodial cost plus \$60,000 allocated from the Cafeteria.

Step – Down Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)	60,000	120,000	180,000
Custodial allocation		(150,000)	50,000	?
Total after allocation	\$ 0	\$ 0	\$ 570,000	?

$$\$150,000 \times \frac{25,000}{25,000 + 50,000} = \$50,000$$

Allocation base: Square feet occupied

Step – Down Method



	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
Departmental costs before allocation	\$ 360,000	\$ 90,000	\$ 400,000	\$ 700,000
Cafeteria allocation	(360,000)	60,000	120,000	180,000
Custodial allocation		(150,000)	50,000	100,000
Total after allocation	\$ 0	\$ 0	\$ 570,000	\$ 980,000

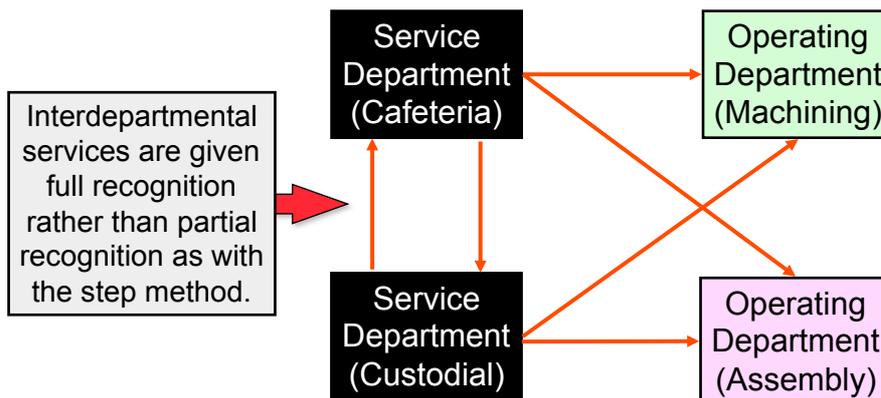
$$\$150,000 \times \frac{50,000}{25,000 + 50,000} = \$100,000$$

Allocation base: Square feet occupied

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4-101

Reciprocal Method



Because of its mathematical complexity, the reciprocal method is rarely used.

4-102

Quick Check Data for Direct Methods



	Service Departments		Operating Departments	
	ADMIN	BACS	Accounting	Others
Departmental costs before allocation	\$ 180.000	\$ 90.000	\$ 190.000	\$ 900.000
Number of employees	15	5	20	80
Number of PCs	12	20	18	102

The direct method of allocation is used

Allocation bases:

- Business school administration costs (ADMIN): Number of employees
- Business Administration computer services (BACS): Number of personal computers

4-103

Quick Check ✓



How much cost will be allocated from Administration to Accounting?

- \$ 36,000
- \$144,000
- \$180,000
- \$ 27,000

4-104

Quick Check ✓



How much cost will be allocated from Administration to Accounting?

- a. \$ 36,000
b. \$144,000

	Service Departments		Operating Departments	
	ADMIN	BACS	Accounting	Others
Departmental costs before allocation	\$ 180,000	\$ 90,000	\$ 190,000	\$ 900,000
ADMIN allocation	(180,000)		36,000	144,000

$$\$180,000 \times \frac{20}{20 + 80} = \$36,000$$

4-105

Quick Check ✓



How much total cost will be allocated from ADMIN and BACS combined to the Accounting Department?

- a. \$ 52,500
b. \$135,000
c. \$270,000
d. \$ 49,500

4-106

	Service Departments		Operating Departments	
	ADMIN	BACS	Accounting	Others
Departmental costs before allocation	\$ 180,000	\$ 90,000	\$ 190,000	\$ 900,000
ADMIN allocation	(180,000)		36,000	144,000
BACS allocation	-	(90,000)	13,500	76,500
Total after allocation	\$ -	\$ -	\$ 239,500	\$ 1,120,500

b. \$135,000
 c. \$270,000
 d. \$ 49,500

$$\$90,000 \times \frac{18}{18 + 102} = \$13,500$$

4-107

Quick Check Data for Step - Down Methods

	Service Departments		Operating Departments	
	ADMIN	BACS	Accounting	Others
Departmental costs before allocation	\$ 180,000	\$ 90,000	\$ 190,000	\$ 900,000
Number of employees	15	5	20	80
Number of PCs	12	20	18	102

The step method of allocation is used.

Allocation bases:

- Business school administration costs (ADMIN): Number of employees
- Business administration computer services (BACS): Number of personal computers

4-108

Quick Check ✓



How much total cost will be allocated from ADMIN and BACS combined to the Accounting Department?

- a. \$35,250
- b. \$49,072
- c. \$18,000
- d. \$26,333

Quick Check ✓



How much total cost will be allocated from ADMIN and BACS combined to the Accounting Department?

- a. \$35,250
- b. \$49,072**
- c. \$18,000
- d. \$26,333

	Service Departments		Operating Departments	
	ADMIN	BACS	Accounting	Others
Departmental costs before allocation	\$ 180,000	\$ 90,000	\$ 180,000	\$ 900,000
ADMIN allocation	(180,000)	8,571	34,286	137,143
BACS allocation	-	(98,571)	14,786	83,786
Total after allocation	\$ -	\$ -	\$ 239,071	\$ 1,120,929



CASE STUDY

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4-111



Exercise on Direct Vs Step-Down Method: DATA (I)

“I can't understand what's happening here,” said Mike Holt, president of Severson Products, Inc. “We always seem to bid too high on jobs that require a lot of labor time in the Finishing Department, and we always seem to get every job we bid on that requires a lot of machine time in the Milling Department. Yet we don't seem to be making much money on those Milling Department jobs. I wonder if the problem is in our overhead rates.”

Severson Products manufactures high-quality wood products to customers' specifications. Some jobs take a large amount of machine work in the Milling Department, and other jobs take a large amount of hand finishing work in the Finishing Department. In addition to the Milling and Finishing departments, the company has three service departments.

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Exercise on Direct Vs Step-Down Method: DATA (II)



The costs of these service departments are allocated to other departments *in the order listed below*. (For each service department, use the most appropriate allocation base.)

	Total Labor- Hours	Square Feet of Space Occupied	Number of Employees	Machine- Hours	Direct Labor- Hours
Cafeteria.....	16,000	12,000	25		
Custodial Services.....	9,000	3,000	40		
Machinery Maintenance.....	15,000	10,000	60		
Milling.....	30,000	40,000	100	160,000	20,000
Finishing.....	100,000	20,000	300	40,000	70,000
	<u>170,000</u>	<u>85,000</u>	<u>525</u>	<u>200,000</u>	<u>90,000</u>

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Exercise on Direct Vs Step-Down Method: DATA (III)



Budgeted overhead costs in each department for the current year are as follows:

Cafeteria	\$ 320,000*
Custodial Services	65,400
Machinery Maintenance	93,600
Milling.....	416,000
Finishing	166,000
Total budgeted cost	<u>\$1,061,000</u>

*This represents the amount of cost subsidized by the company.

The company has always allocated service department costs to the operating departments (Milling and Finishing) using the direct method of allocation, because of its simplicity.

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Exercise on Direct Vs Step-Down Method: REQUIRED (I)



- 1) Allocate service department costs to operating departments by the step-down method. Then compute predetermined overhead rates in the operating departments for the current year, using machine-hours as the allocation base in the Milling Department and direct labor-hours as the allocation base in the Finishing Department.
- 2) Repeat (1) above, this time using the direct method. Again compute predetermined overhead rates in the Milling and Finishing Departments.

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Exercise on Direct Vs Step-Down Method: REQUIRED (II)



- 3) Assume that during the current year the company bids on a job that requires machine and labor time as follows:

	Machine- Hours	Direct Labor-Hours
Milling Department	2,000	1,600
Finishing Department	<u>800</u>	<u>13,000</u>
Total hours	<u>2,800</u>	<u>14,600</u>

Now, determine the amount of overhead that would be assigned to the job if the company used the overhead rates developed in (1) above. Then determine the amount of overhead that would be assigned to the job if the company used the overhead rates developed in (2) above.

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