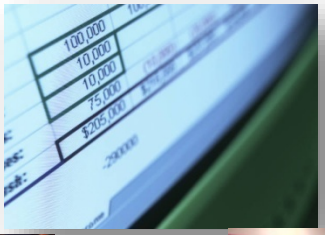
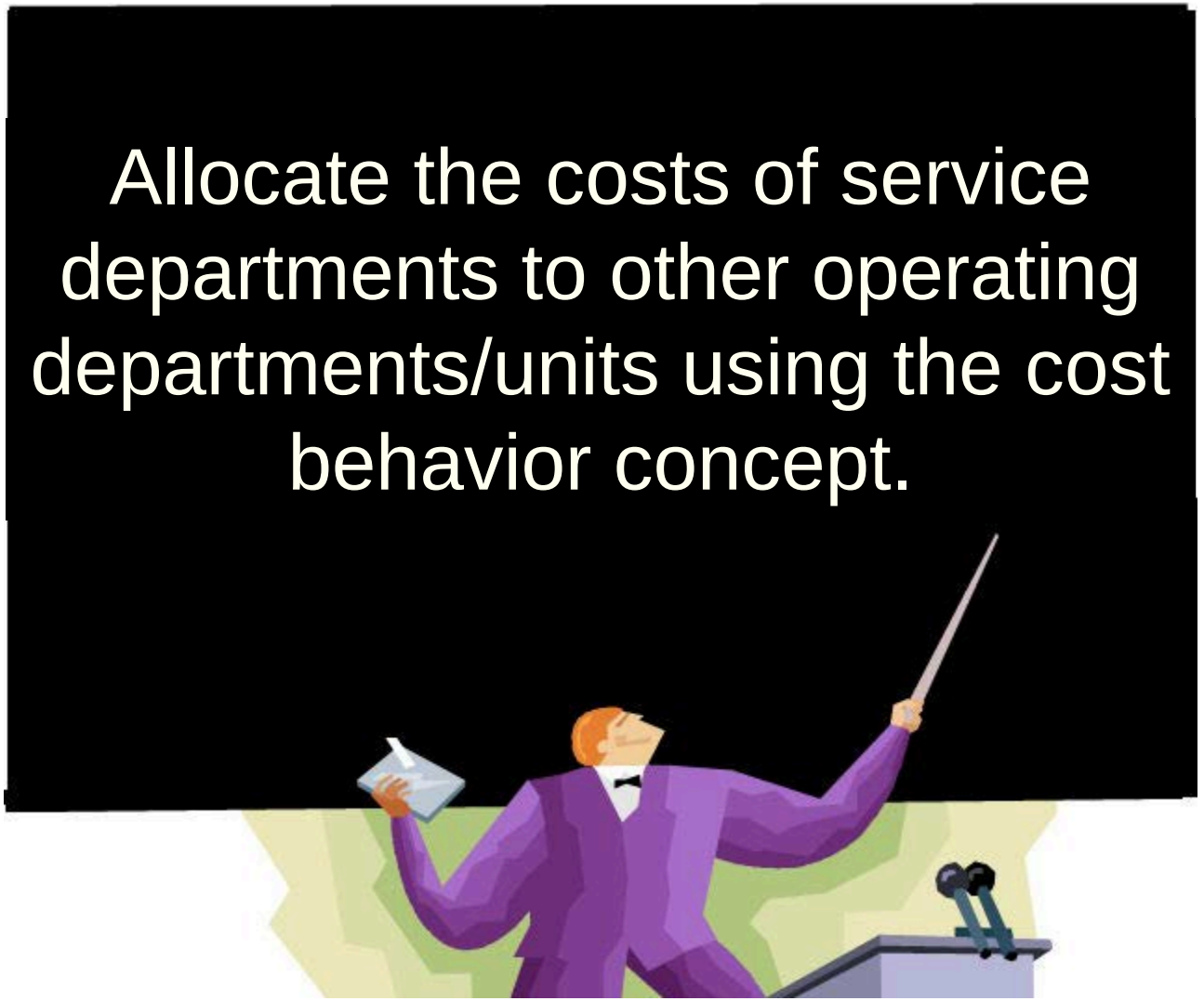


Cost Allocations of Service Departments

Chapter 4, Appendix B

Learning Objective 1



Service Department Charges

Operating Departments

Carry out central purposes of organization.

Service Departments

Do not directly engage in operating activities.

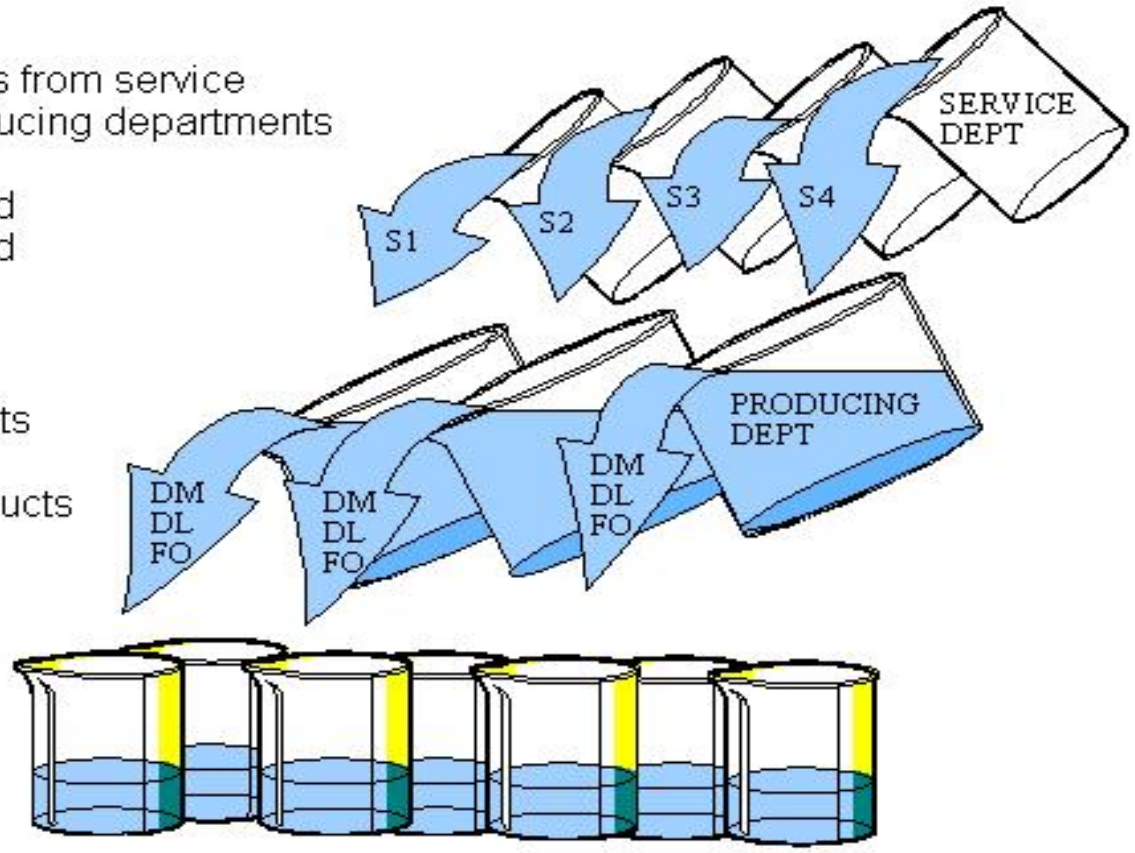
Clarification

- We are talking about **the service cost to support the major operating activities (i.e., supporting service).**
- Service costs might be used to support manufacturing activities or other non-manufacturing activities.
- Typical examples of supporting departments are information systems and plant maintenance.
- The maintenance department helps various manufacturing or non-manufacturing departments; those for manufacturing department will be eventually charged into the MOH of the products through manufacturing departments.
- Selling department is usually treated as an operating department.

Two-stage Costing System (manufacturing company)

Stage I: Assign costs from service departments to producing departments
1. Direct method
2. Step-down method
3. Reciprocal method

Stage 2: Assign costs from producing departments to products



Reasons for Charging Service Department Costs

Service department costs are charged to operating departments for a variety of reasons including:

To encourage operating departments to wisely use service department resources.

To provide operating departments with more complete cost data for making decisions.

To help measure the profitability of operating departments.

To create an incentive for service departments to operate efficiently.

Charging Costs by Behavior

Charge fixed service department costs to consuming departments in predetermined lump-sum amounts that are based on the consuming department's peak-period or long-run average servicing needs.

- Are based on amounts of capacity each consuming department requires.
- Should not vary from period to period.

Should Actual or Budgeted Costs Be Charged?

Budgeted variable and fixed service department costs should be charged to operating departments.

Note:

- Budgeted variable RATE and Budgeted fixed costs.
- **i.e., allocated variable costs = Budgeted rate x actual activities.**

Discuss:
Why budgeted variable cost rate or budgeted fixed costs? Not actual costs?

Guidelines for service department charges

1. Variable and fixed service department costs should be charged separately.
2. **Variable costs** should be charged using:

   Predetermined rate X actual service hours
3. **Fixed costs** should be charged in lump sums to each operating department proportion to their peak-period needs or long-run average needs: (i.e., the predetermined percentage is calculated by the capacity of these operating departments)
   - **Predetermined total** fixed costs;
   - **Predetermined allocation percentage** for each operating department.

Discussion:

Why fixed costs of service departments are allocated based on the peak-period needs of operating departments (i.e., the max. capacity of operating departments)? Any justification?

Discussion:

Such an arrangement has any implication for operating departments?

Sipco: An Example

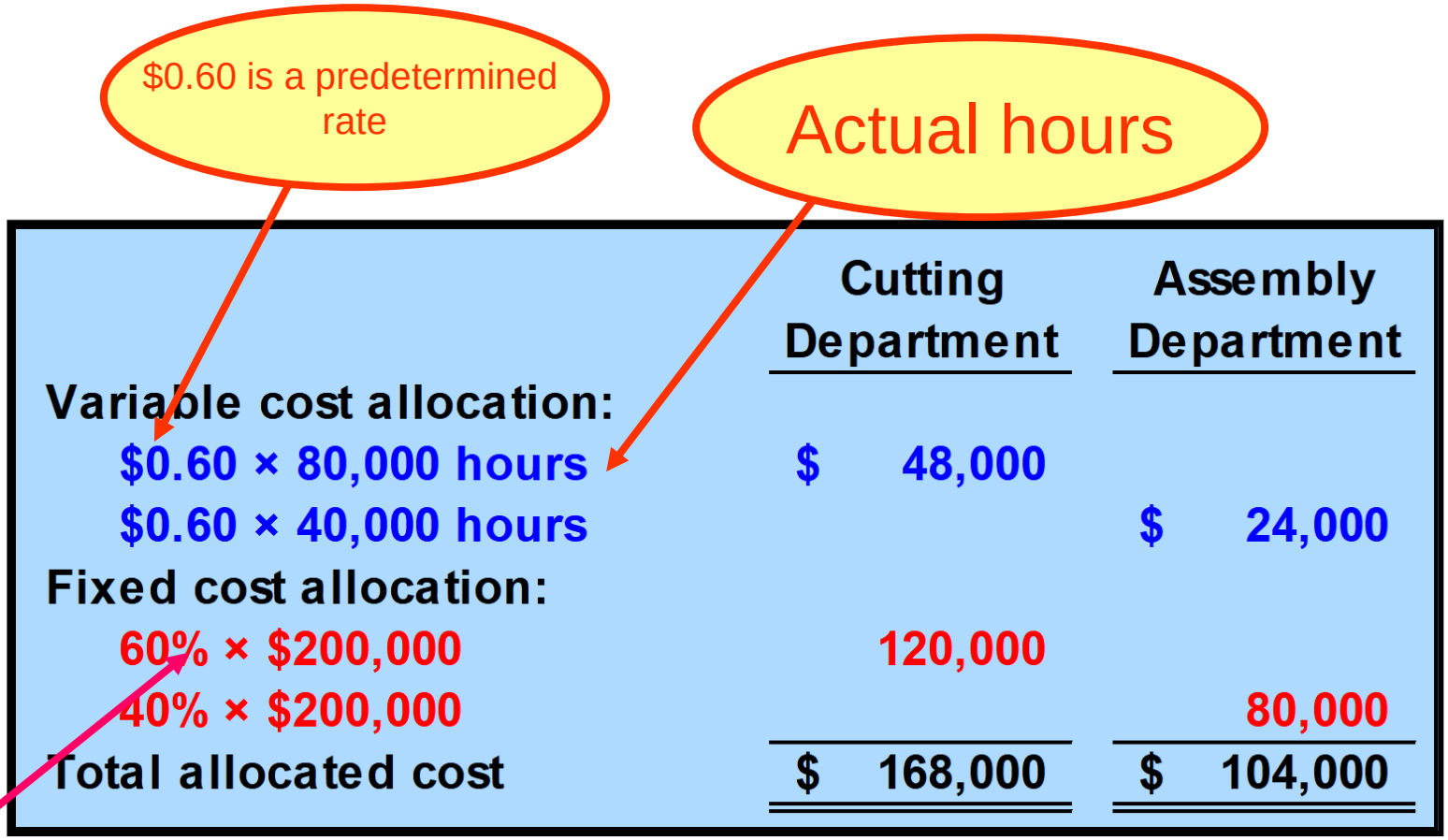
Sipco has a maintenance department and two operating departments: Cutting and Assembly. Variable maintenance costs are budgeted at $0.60 per machine hour. Fixed maintenance costs are **budgeted at $200,000** per year.

Operating Departments	Percent of Peak-Period Capacity Required	Hours Planned	Hours Used
Cutting	60%	75,000	80,000
Assembly	40%	50,000	40,000
Total hours	100%	125,000	120,000

Important: the 60% vs. 40% is predetermined, NOT based on the planned hours (75,000 vs. 50,000) (here the planned hours are set at the capacity). Allocable fixed costs are also predetermined (i.e., budgeted at $200,000), not the actual fixed cost.

Facilities of service department are usually based on the max. capacity of operating departments (that is why the percentage is based on max. capacity of operating departments). But planned hours are not necessarily at capacity.

Sipco: End of the Year



Quick Check ✓

Foster City has an ambulance service that is used by the two public hospitals in the city. Variable ambulance costs are budgeted at $4.20 per mile. Fixed ambulance costs are budgeted at $120,000 per year. Data relating to the current year are:

Hospitals	Percent of Peak-Period Capacity Required	Miles Planned	Miles Used
Mercy	45%	15,000	16,000
Northside	55%	17,000	17,500
Total	100%	32,000	33,500

Quick Check ✓

How much ambulance service cost will be allocated to Mercy Hospital at the end of the year?

a. $121,200

b. $254,400

c. $139,500

d. $117,000

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Quick Check ✓

How much ambulance service cost will be allocated to Mercy Hospital at the end of the year?

a. $121,200

b. $254,400

c. $139,500

d. $117,000

	Mercy	Northside
Variable cost allocation:		
$4.20 × 16,000 miles	$ 67,200	
$4.20 × 17,500 miles		$ 73,500
Fixed cost allocation		
45% × $120,000	54,000	
55% × $120,000		66,000
Total allocated cost	$ 121,200	$ 139,500

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Discussion

If a company uses the ***ACTUAL*** variable cost rate and the ***ACTUAL*** fixed costs of the service department, in the allocation of these costs to the operating departments, what are the potential problems caused by this allocation?

Do we care about the actual activity level of the operating departments?

If we use the **allocation percentage based on *ACTUAL* number of hours** consumed by these operating departments (i.e., not the *predetermined* percentage but the percentage of relative actual activity levels) for the allocation of the fixed cost of the service department.

What are the potential problems?

Answer: Fixed costs allocated to one department are heavily influenced by what happens in other departments.

Autos R Us – An Example

Autos R Us has one service department and three sales departments, New Cars, Used Cars, and Car Parts. The service department has fixed costs of $80,000 for both years in the example.
Contrary to good practice, Autos R Us allocates the service department costs based on sales.

Autos R Us – First-year Allocation

	Departments			
	New	Used	Parts	Total
Sales by department	$ 1,500,000	$ 900,000	$ 600,000	$ 3,000,000
Percentage of total sales	50%	30%	20%	100%
Allocation of service department costs	$ 40,000	$ 24,000	$ 16,000	$ 80,000

$1,500,000 ÷ $3,000,000

50% of $80,000

In the next year, the manager of the New Cars department increases sales by $500,000. Sales in the other departments are unchanged. Let's allocate the $80,000 service department cost for the second year given the sales increase.

Autos R Us – Second-year Allocation

	Departments			
	New	Used	Parts	Total
Sales by department	$ 2,000,000	$ 900,000	$ 600,000	$ 3,500,000
Percentage of total sales	57%	26%	17%	100%
Allocation of service department costs	$ 45,714	$ 20,571	$ 13,714	$ 80,000

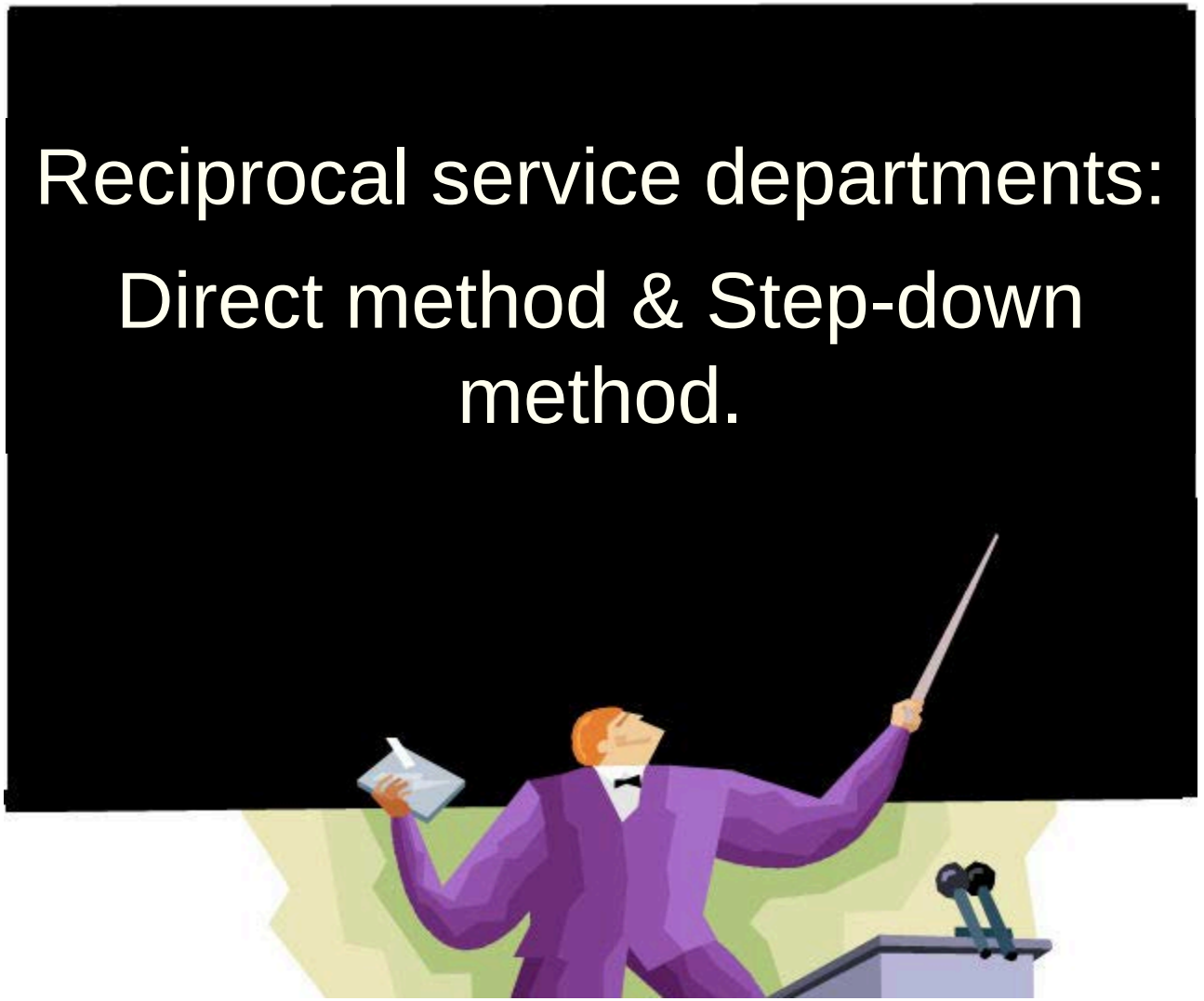
$2,000,000 ÷ $3,500,000

57% of $80,000

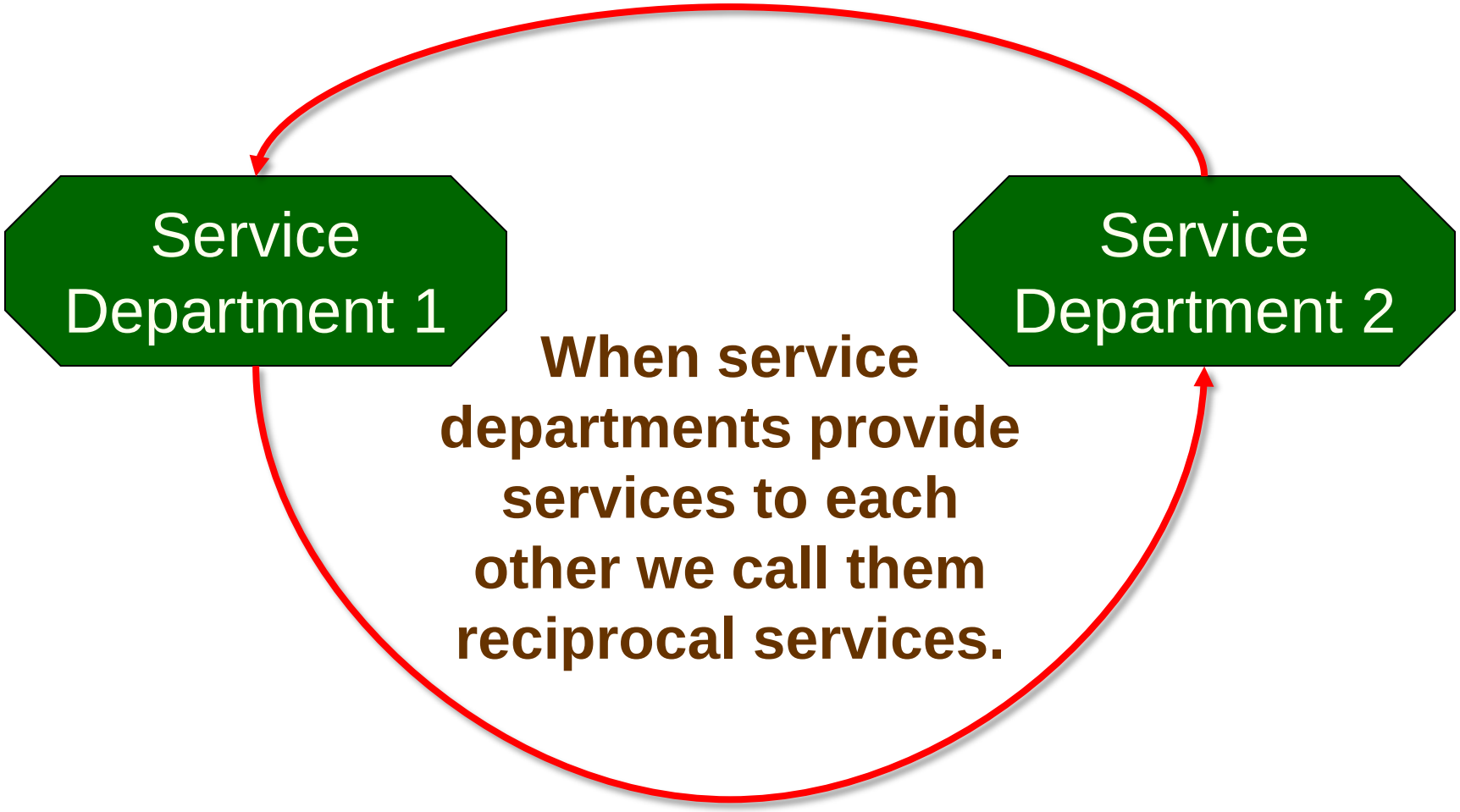
Other two departments benefit from the lower allocated costs!

If you were the manager of the New Cars department, would you be happy with the increased service department fixed costs allocated to your department?

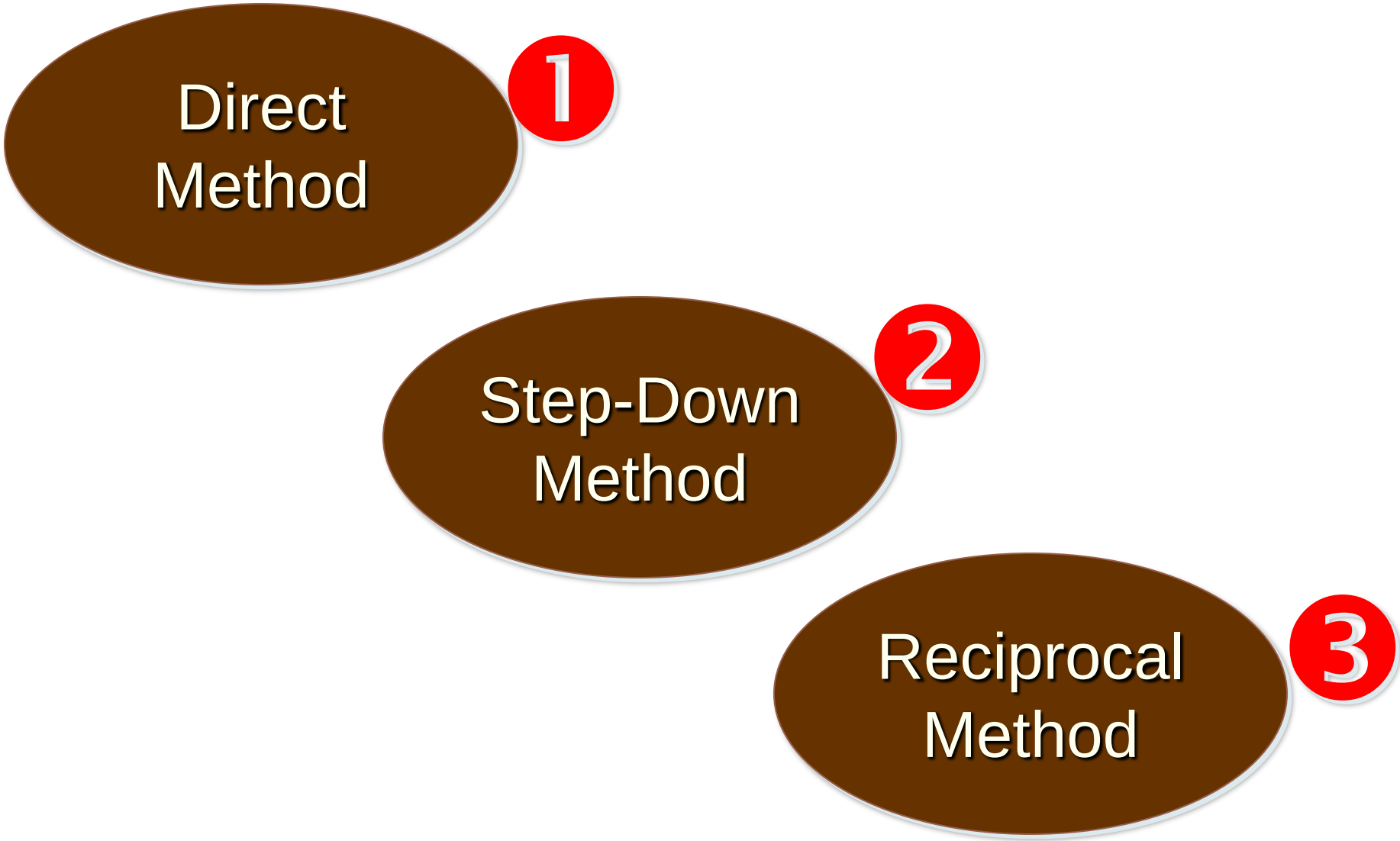
Learning Objective 2



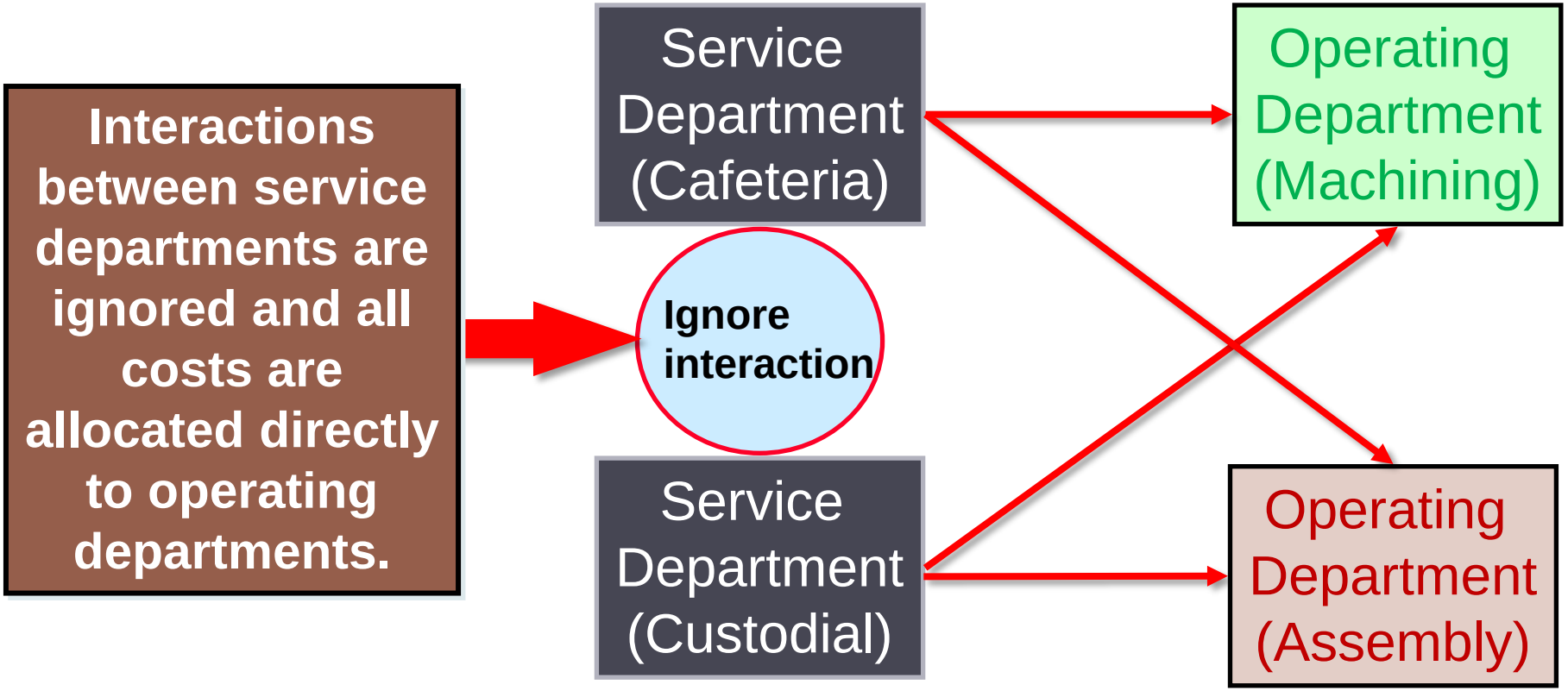
Reciprocal Services



Allocation Approaches



Direct Method



Direct Method – An Example

Data for the 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

Direct Method – An Example

	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?

Direct Method – An Example

	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

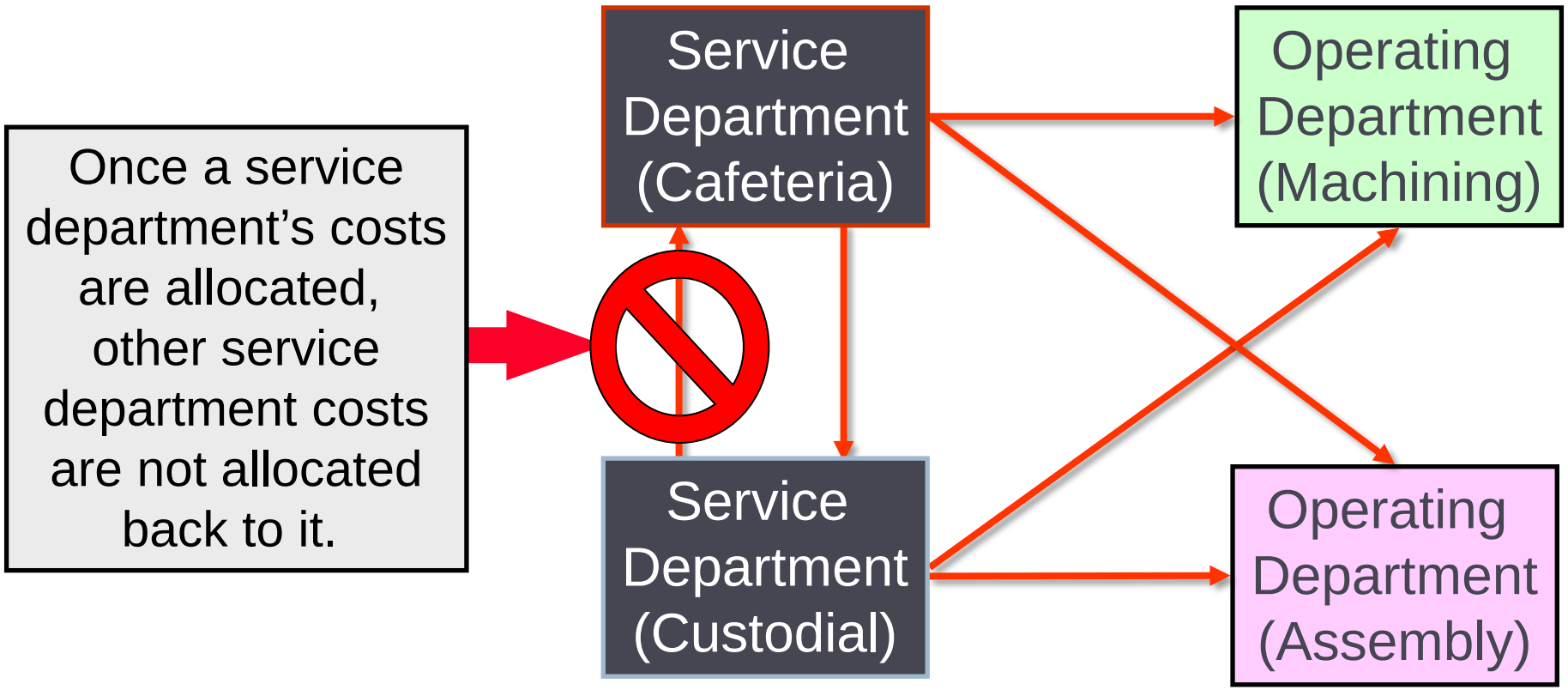
Direct Method – An Example

	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

Step-Down Method



Step-Down Method – An Example

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

Step-Down Method – An Example

In first step, we allocate Cafeteria costs to other THREE departments

	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 – An Example

	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 – An Example

	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 – An Example

	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 – An Example

	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

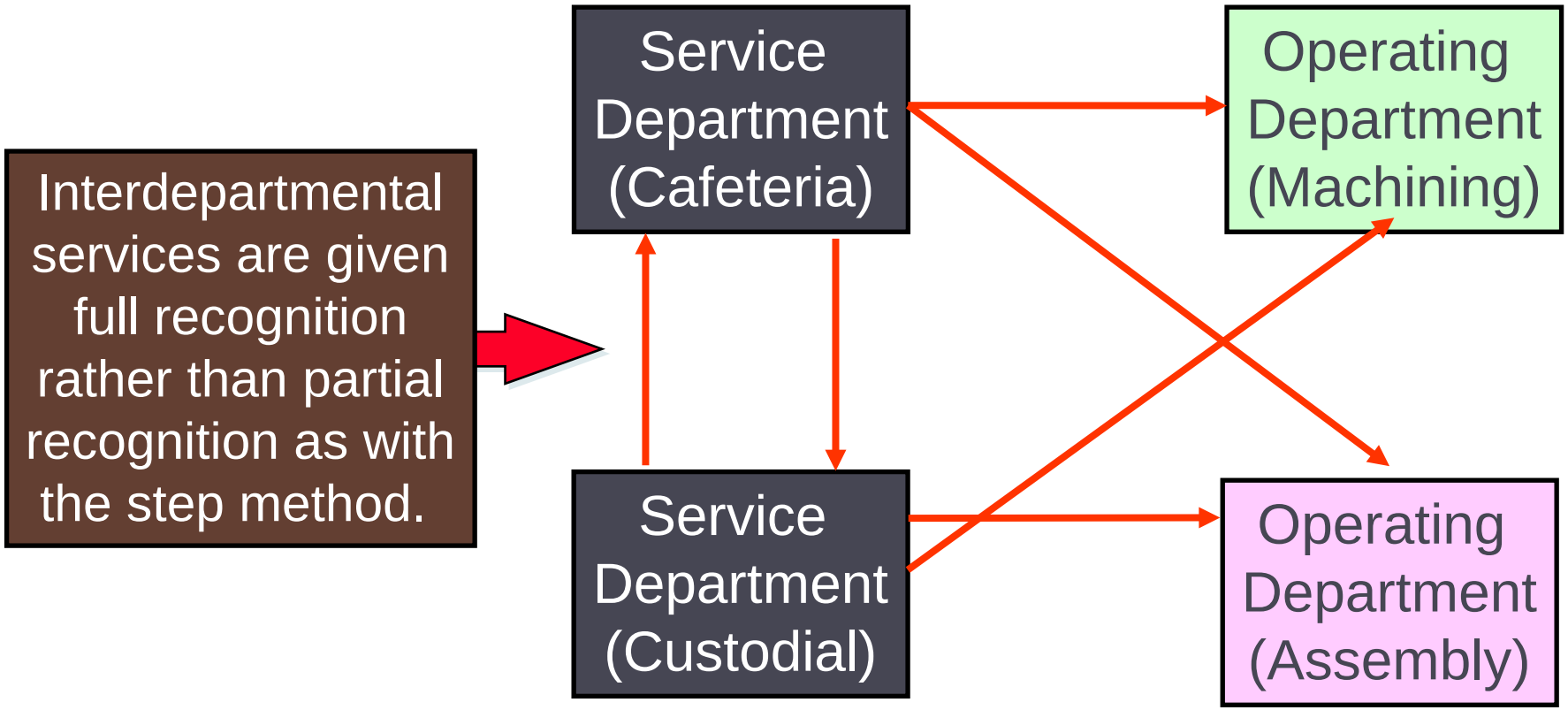
Step-Down Method – An Example

	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

Reciprocal Method



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

Reciprocal method: Illustrations

Two support departments: PM and IS

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	A	B	C	D	E	F	G
1		SUPPORT DEPARTMENTS			OPERATING DEPARTMENTS		
2		Plant Maintenance	Information Systems		Machining	Assembly	Total
3	Budgeted overhead costs						
4	before any interdepartment cost allocations	$6,300,000	$1,452,150		$4,000,000	$2,000,000	$13,752,150
5	Support work furnished:						
6	By Plant Maintenance						
7	Budgeted labor-hours	—	4,000		6,000	10,000	20,000
8	Percentage	—	20%		30%	50%	100%
9	By Information Systems						
10	Budgeted computer hours	500	—		4,000	500	5,000
11	Percentage	10%	—		80%	10%	100%

Reciprocal method: Illustrations

Two support departments: PM and IS

Express the reciprocal relationships in the form of Linear Equations:

PM = $6,300,000 + 0.1 x IS (1)

IS = $1,452,150 + 0.2 x PM (2)

PM = $6,576,750

IS = $2,767,500

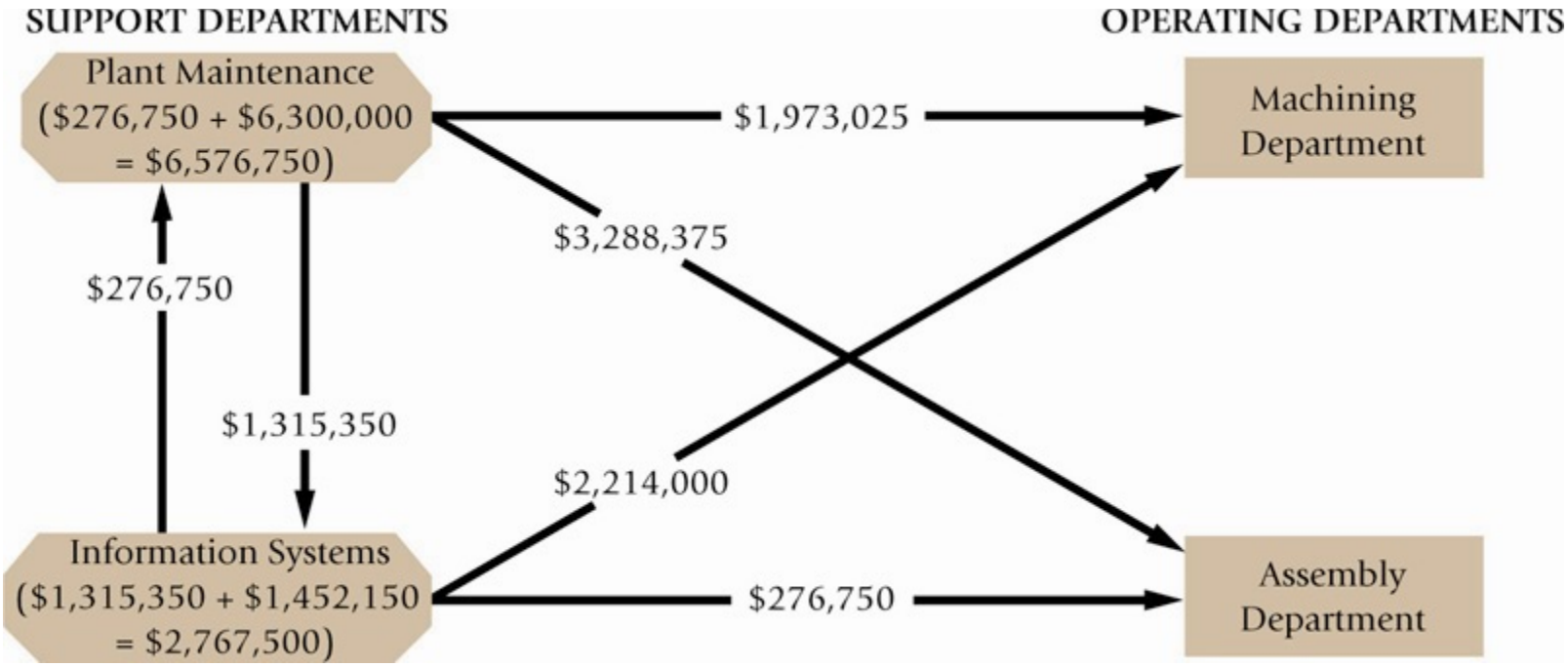
Reciprocal Allocation Method (Linear Equations)

For PM department:

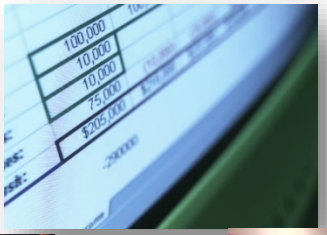
- Three allocations: 100% = 20% +30%+50%
- $6,576,750 = $1,315,350 + $1,973,025 + $3,288,375

For Total costs allocated to these two operating departments:

- $7,752,150= $1,973,025 + $3,288,375 + $2,214,000 + $276,750
- It is equal to the total costs of two service departments ($6,300,000 + $1,452,150)



End of Chapter 4 (Appendix B)

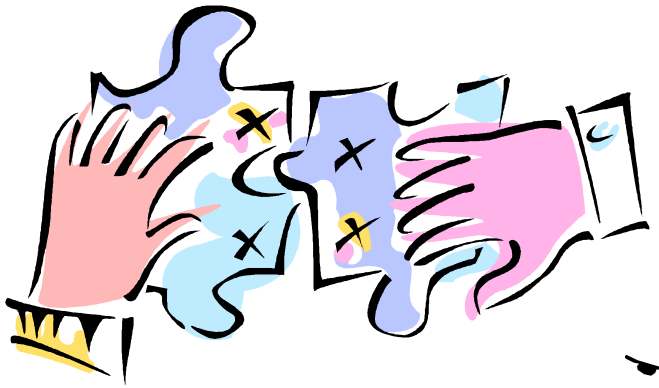


Transfer Pricing

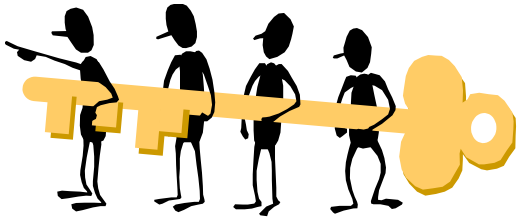
Chapter 11

Key Concepts/Definitions

A transfer price is the price charged when one segment of a company provides goods or services to another segment of the company.



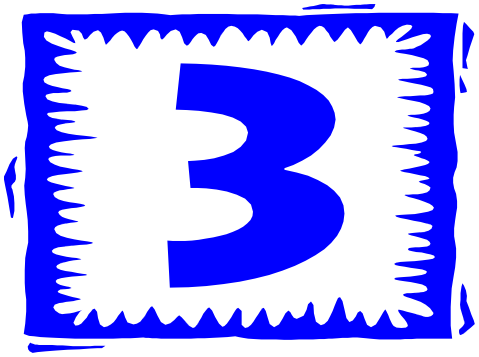
The fundamental objective in setting transfer prices is to motivate managers to act in the best interests of the overall company.



Transfer Pricing

- Management control systems use transfer prices to coordinate the actions of sub-units and to evaluate their performance.
- The transfer price creates revenues for the selling subunit and purchase costs for the buying subunit affecting each subunit's operating income.
- Intermediate product—the product or service transferred between subunits of an organization.

Three Primary Approaches



There are three primary approaches to set the transfer prices:

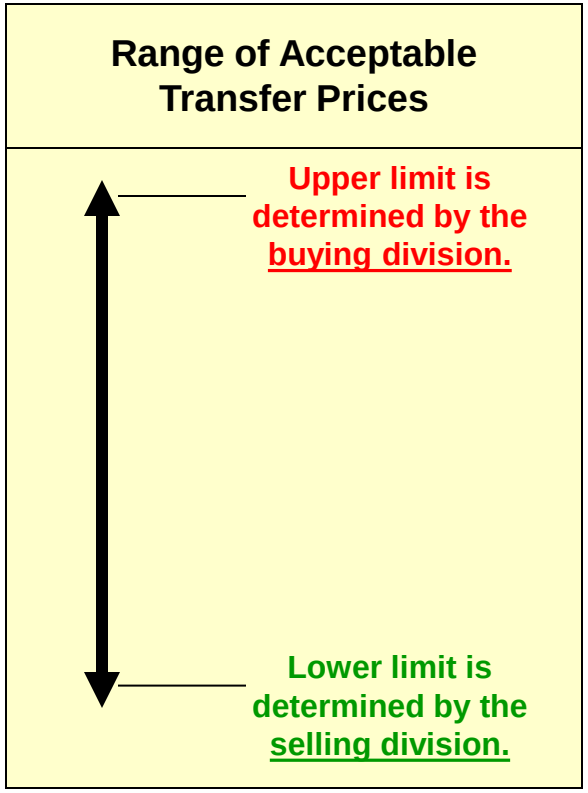
1. **Negotiated transfer prices;**
2. **Transfers at the cost to the selling division; and**
3. **Transfers at market price.**

Negotiated Transfer Prices

A negotiated transfer price results from discussions between the selling and buying divisions.

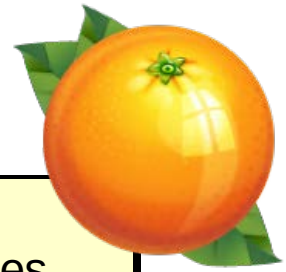
Advantages of negotiated transfer prices:

1. They preserve the autonomy of the divisions, which is consistent with the spirit of decentralization.
2. The managers negotiating the transfer price are likely to have much better information about the potential costs and benefits of the transfer than others in the company.



Grocery Storehouse – An Example

Assume the information as shown with respect to West Coast Plantations and Grocery Mart (both companies are owned by Grocery Storehouse).



West Coast Plantations:			
Naval orange harvest capactiy per month		10,000	crates
Variable cost per crate of naval oranges	$	10	per crate
Fixed costs per month	$	100,000	
Selling price of navel oranges on the outside market	$	25	per crate
Grocery Mart:			
Purchase price of current naval oranges	$	20	per crate
Monthly sales of naval oranges		1,000	crates

Grocery Storehouse – An Example

The selling division's (West Coast Plantations) lowest acceptable transfer price is calculated as:

$$\text{Transfer Price} \geq \text{Variable cost per unit} + \frac{\text{Total contribution margin on lost sales}}{\text{Number of units transferred}}$$

The buying division's (Grocery Mart) highest acceptable transfer price is calculated as:

$$\text{Transfer Price} \leq \text{Cost of buying from outside supplier}$$

Let's calculate the lowest and highest acceptable transfer prices under three scenarios.

Grocery Storehouse – An Example

If West Coast Plantations has sufficient idle capacity (3,000 crates) to satisfy Grocery Mart's demands (1,000 crates), without sacrificing sales to other customers, then the lowest and highest possible transfer prices are computed as follows:

Selling division's lowest possible transfer price:

$$\text{Transfer Price} \geq \$10 + \frac{\$0}{1{,}000} = \$10$$

Buying division's highest possible transfer price:

$$\text{Transfer Price} \leq \text{Cost of buying from outside supplier} = \$20$$

Therefore, the range of acceptable transfer prices is $10 – $20.

Grocery Storehouse – An Example

If West Coast Plantations has no idle capacity (0 crates) and must sacrifice other customer orders (1,000 crates) to meet Grocery Mart's demands (1,000 crates), then the lowest and highest possible transfer prices are computed as follows:

Selling division's lowest possible transfer price:

$$\text{Transfer Price} \geq \$\ 10 + \frac{(\$25 - \$10) \times 1{,}000}{1{,}000} = \$\ 25$$

Buying division's highest possible transfer price:

$$\text{Transfer Price} \leq \text{Cost of buying from outside supplier} = \$20$$

Therefore, there is no range of acceptable transfer prices.

Grocery Storehouse – An Example

If West Coast Plantations has some idle capacity (400 crates) and must sacrifice other customer orders (600 crates) to meet Grocery Mart's demands (1,000 crates), then the lowest and highest possible transfer prices are computed as follows:

Selling division's lowest possible transfer price:

$$\text{Transfer Price} \geq \$10 + \frac{(\$25 - \$10) \times 600}{1{,}000} = \$19.00$$

Buying division's highest possible transfer price:

$$\text{Transfer Price} \leq \text{Cost of buying from outside supplier} = \$20$$

Therefore, the range of acceptable transfer prices is $19.00 – $20.00.

Transfers at Market Price

A market price (i.e., the price charged for an item on the open market) is often regarded as the best approach to the transfer pricing problem.

1. **A market price approach works best when the product or service is sold in its present form to outside customers and the selling division has no idle capacity.**
2. **A market price approach does not work well when the selling division has idle capacity.**

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Discussion: Market-based transfer price (P11-23)

Stavos Company's Cabinet Division manufactures a standard cabinet for television sets. The cost per cabinet is:

Variable cost per cabinet	$70
Fixed cost per cabinet (based on capacity of 10,000 per year)	30
Total cost per cabinet	$100

Part of the Cabinet Division's output is sold to outside manufacturers of TV and part is sold to Stavos's Quark Division, which produces a TV set under its own name. **The Cabinet Division charges $140 per cabinet for all sales (i.e., market price for transfer price).** The cost, revenue and net operating income associated with Quark Division's TV set is given:

Selling price per TV		$480
Variable cost per TV:		
Cost of the cabinet	$140	
Variable cost of electronic parts	$210	
Total variable cost		$350
Contribution Margin		130
Fixed costs per TV (based on 3,000 sets)		80
Net operating income per TV		$50

Discussion: Market-based transfer price (P11-23)

The Quark Division has an order from an overseas source for 1,000 TV sets. The overseas source wants to pay only $340 per set.

Q1: Assume that Quark Division has enough idle capacity to fill the 1,000 set order. Is the division likely to accept the $340 price or to reject it?

Q2: Assume that both the Cabinet Division and the Quark Division have idle capacity. Would it be advantageous for the company as a whole if the Quark Division rejects the $340 price?

Discussion: Market-based transfer price

Answers to Q1: Quark Division will probably reject $340 because its variable cost is $350.

Answer to Q2: Need to consider Cabinet Division's idle capacity.

The Company as a whole to sell one TV set at the variable cost: $70 + $210 = $280.

From the company's perspective, it is better to accept $340.

Conclusion: with idle capacity, the market price as transfer price might not serve the interest of the company as a whole.

Discussion: Market-based transfer price

Q3: Assume that the Quark Division has idle capacity but the Cabinet Division is operating at capacity and could sell all of its cabinets to outside manufacturers. Compute the profit impact to the Quark Division of accepting the 1,000-set order at the $340 unit price.

Q4: What conclusions do you draw concerning the use of market price as a transfer price in intra-company transactions?

Discussion: Market-based transfer price

Answers to Q3:

If the Cabinet Division is operating at capacity, any cabinets transferred to the Quark Division to fill the overseas order will have to be diverted from outside customers. Whether a cabinet is sold to outside customers or is transferred to the Quark Division, its production cost is the same.

- It implies that we do not consider the variable/fixed costs for each cabinet at the Cabinet Division. In other words, **we will not consider the variable cost of $70. Only the second division's additional variable cost ($210) is relevant.**
- **The first-stage selling price ($140) is also relevant to the decision.**

However, if a set is diverted from outside sales, the Cabinet Division (and the entire company) loses the $140 in revenue. As a consequence, as shown below, there would be a net loss of $10 on each TV set sold for $340.

Price offered per set		$340
Less:		
Lost revenue from sales of cabinets to outsiders..	$140	
Variable cost of Quark Division	210	350
Net loss per TV		($ 10)

Conclusion: without idle capacity, it is better to reject $340 sale for the company as a whole. **It is the same choice for Quark Division would do.**

Discussion: Market-based transfer price

Q4: What conclusions do you draw concerning the use of market price as a transfer price in intra-company transactions?

When the selling division has no idle capacity, as in part (3), market price works very well as a transfer price. The cost to the company of a transfer when there is no idle capacity is the lost revenue (i.e., market price) from sales to outsiders. If the market price is used as the transfer price, the buying division will view the market price of the transferred item as its cost—which is appropriate because that is the cost to the company. As a consequence, the manager of the buying division should be motivated to make decisions that are in the best interests of the company.

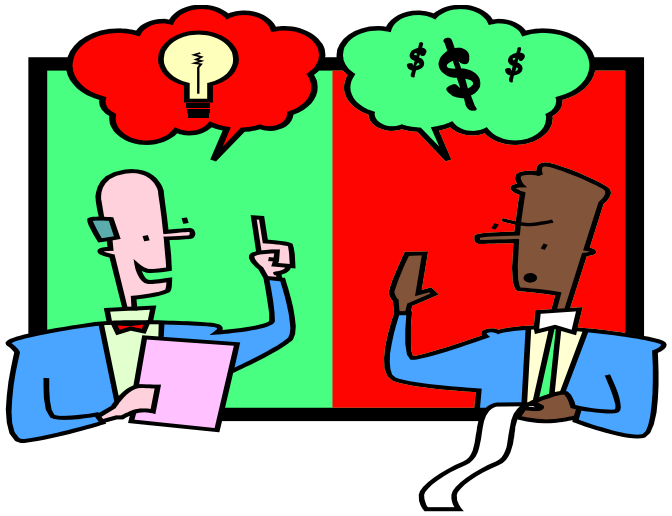
When the selling division has idle capacity, the cost to the company of the transfer is just the variable cost of producing the item. If the market price is used as the transfer price, the manager of the buying division will view that as his/her cost rather than the real cost to the company, which is just variable cost. Hence, the manager will have the wrong cost information for making decisions as we observed in parts (1) and (2) above.

Transfers at the Cost to the Selling Division

Many companies set transfer prices at either the variable cost or full (absorption) cost incurred by the selling division.

Drawbacks of this approach include:

1. **Using full cost as a transfer price can lead to sub-optimization.**
2. **The selling division will never show a profit on any internal transfer.**
3. **Actual Cost-based transfer prices do not provide incentives to control costs (the use of Budgeted cost is better).**



Summary exercise

Sako Company's Audio Division produces a speaker that is used by manufacturers of various audio products. Sales and cost data on the speaker follow:

Selling price per unit on the intermediate market	$60
Variable costs per unit	$42
Fixed costs per unit (based on capacity)	$8
Capacity in units	25,000

Sako Company has a Hi-Fi Division that could use this speaker in one of its products. The Hi-Fi Division will need 5,000 speakers per year. It has received a quote of $57 per speaker from another manufacturer. Sako Company evaluate division managers on the basis of divisional profits.

One subtle issue:

Selling price of the speaker by Audio Division ($60) is higher than the purchase price of the speaker by Hi-Fi Division ($57). Otherwise, the company should also use Audio Division's speakers to supply to the demand of Hi-Fi Division.

Summary exercise

Part I:
Assume that the Audio Division is now selling only 20,000 speakers per year to outside customers.

Key: now the Audio Division has idle capacity to fulfill 5,000 transferred units

(a) From the standpoint of the Audio Division, what is the lowest acceptable transfer price for speakers to be sold to HI-FI Division?

Lowest transfer price = variable cost + (CM of the lost sales/units transferred)

Because there is idle capacity for Audio Division, there is NO lost sales. So, lowest transfer price = $42.

Summary exercise

(b) From the standpoint of the HI-FI Division, what is the highest acceptable transfer price?

Highest transfer price = cost of purchasing from outsider = $57

(c) If left free to negotiate without interference, would you expect the division managers to voluntarily agree to the transfer of 5,000 speakers from the Audio Division to the Hi-Fi Division? Why or Why not?

Combining the requirements of both the selling division and the buying division, the acceptable range of transfer prices in this situation is from $42 to $57. The transfer should take place.

Summary exercise

(d) From the standpoint of the entire company, should the transfer take place? Why or Why not?

From the standpoint of the entire company, the transfer should take place. The cost of the speakers transferred is only $42 and the company saves the $57 cost of the speakers purchased from the outside supplier.

Summary exercise (part II)

Part II:
Assume that the Audio Division is now selling only **22,000** speakers per year to outside customers.

(a) From the standpoint of the Audio Division, what is the lowest acceptable transfer price for speakers to be sold to HI-FI Division?

(b) From the standpoint of the HI-FI Division, what is the highest acceptable transfer price?

(c) From the standpoint of the entire company, should the transfer take place? Why or Why not?

- In-class case discussion
  (Birch Paper Inc)

- Homework

Homework:
See the homework assignment #2 file on the Moodle.

Deadline: (will be announced in class)

End of Chapter 11