

**AGENDA: PERFORMANCE MEASUREMENT IN DECENTRALIZED ORGANIZATIONS**

- A. Measures of performance in investment centers.
  - 1. Return on investment (ROI).
  - 2. Residual income.
- B. Operating performance measures
- C. The balanced scorecard.
- D. (Appendix 11A) Transfer pricing.
- E. (Appendix 11B) Service department charges.

## RETURN ON INVESTMENT

Investment centers are often evaluated based on their return on investment (ROI), which is computed as follows:

$$\text{ROI} = \frac{\text{Net operating income}}{\text{Average operating assets}}$$

or

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

where:

$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

EXAMPLE: Regal Company reports the following data for last year's operations:

Net operating income .....	\$30,000
Sales .....	\$500,000
Average operating assets ....	\$200,000

$$\text{ROI} = \frac{\$30,000}{\$500,000} \times \frac{\$500,000}{\$200,000} = 6\% \times 2.5 = 15\%$$

To increase ROI, at least one of the following must occur:

1. Increase sales.
2. Reduce expenses.
3. Reduce operating assets.

**RETURN ON INVESTMENT (continued)**

## Example 1—Increase sales:

Assume that Regal Company is able to increase sales to \$600,000 and net operating income increases to \$42,000. Also assume that operating assets are not affected.

$$\text{ROI} = \frac{\$42,000}{\$600,000} \times \frac{\$600,000}{\$200,000} = 7\% \times 3.0 = 21\%$$

(compared to 15% before)

## Example 2—Reduce expenses:

Assume that Regal Company is able to reduce expenses by 10,000 per year, so that net operating income increases from \$30,000 to \$40,000. Also assume that sales and operating assets are not affected.

$$\text{ROI} = \frac{\$40,000}{\$500,000} \times \frac{\$500,000}{\$200,000} = 8\% \times 2.5 = 20\%$$

(compared to 15% before)

## Example 3—Reduce assets:

Assume that Regal Company is able to reduce its average operating assets from \$200,000 to \$125,000. Also assume that sales and net operating income are not affected.

$$\text{ROI} = \frac{\$30,000}{\$500,000} \times \frac{\$500,000}{\$125,000} = 6\% \times 4.0 = 24\%$$

(compared to 15% before)

## RESIDUAL INCOME

Residual income is the net operating income that an investment center earns above the minimum rate of return on its operating assets.

EXAMPLE: Marsh Company has two divisions, A and B. Each division is required to earn a minimum return of 12% on its investment in operating assets.

	<i>Division A</i>	<i>Division B</i>
Average operating assets (given) .....	<u>\$1,000,000</u>	<u>\$3,000,000</u>
Net operating income (given).....	\$ 200,000	\$ 450,000
Minimum required return:		
12% × average operating assets .....	<u>120,000</u>	<u>360,000</u>
Residual income .....	<u>\$ 80,000</u>	<u>\$ 90,000</u>

Economic value added (EVA) is a concept similar to residual income. EVA has been adopted by many companies in recent years.

**RESIDUAL INCOME (continued)**

The residual income approach encourages managers to make profitable investments that would be rejected under the ROI approach.

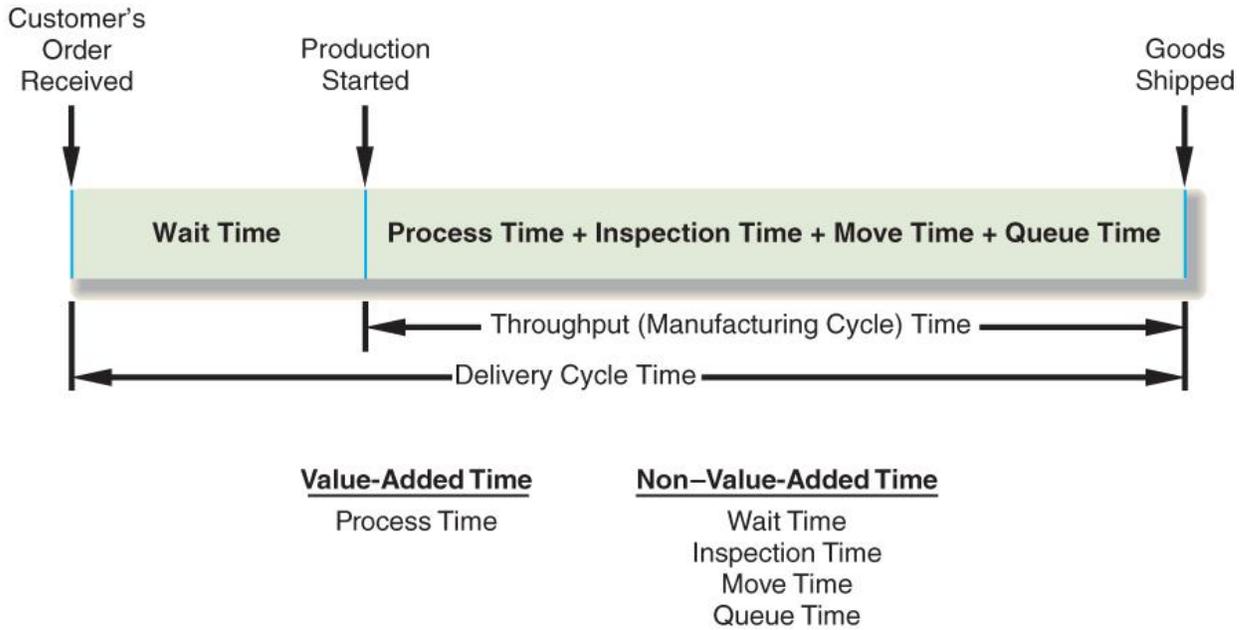
EXAMPLE: Marsh Company’s Division A has an opportunity to make an investment of \$250,000 that would generate a return of 16% on invested assets (i.e., \$40,000 per year). This investment would be in the best interests of the company because the rate of return of 16% exceeds the minimum required rate of return. However, this investment would reduce the division’s ROI:

	<i>Present</i>	<i>New Project</i>	<i>Overall</i>
Average operating assets (a)....	\$1,000,000	\$250,000	\$1,250,000
Net operating income (b) .....	\$200,000	\$40,000	\$240,000
ROI (b) ÷ (a) .....	20.0%	16.0%	19.2%

On the other hand, this investment would increase the division’s residual income:

Average operating assets (a)....	<u>\$1,000,000</u>	<u>\$250,000</u>	<u>\$1,250,000</u>
Net operating income (b) .....	\$ 200,000	\$ 40,000	\$ 240,000
Minimum required return:			
12% × (a) .....	<u>120,000</u>	<u>30,000</u>	<u>150,000</u>
Residual income .....	<u>\$ 80,000</u>	<u>\$ 10,000</u>	<u>\$ 90,000</u>

## SOME IMPORTANT OPERATING PERFORMANCE MEASURES



## **MANUFACTURING CYCLE EFFICIENCY**

Manufacturing cycle efficiency (MCE) is a measure of how much throughput time actually adds value. MCE is defined by:

$$\text{MCE} = \frac{\text{Value-added time}}{\text{Throughput time}} = \frac{\text{Process time}}{\text{Throughput time}}$$

If the MCE is less than 1, the production process contains “non-value-added” time.

An MCE of 0.4 indicates that 60% ( $1.0 - 0.4 = 0.6$ ) of the total production time consists of queuing, inspection, and move time, and therefore only 40% of the total time is productive.

Reducing the non-value-added activities of queuing, inspection, and moving will lead to improvement in MCE.

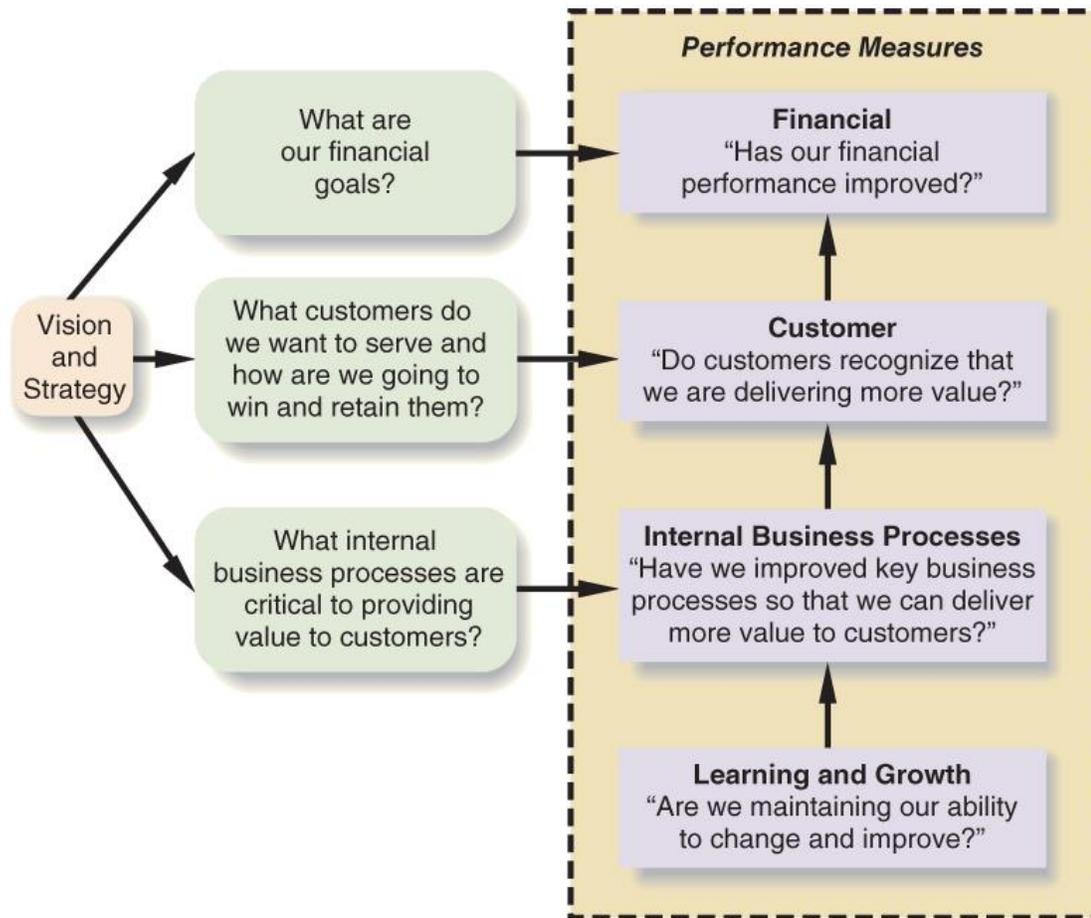
## THE BALANCED SCORECARD

**NOTE: Watch Video from Prezi or Blackboard**

<http://www.youtube.com/watch?v=6AwStmfS2HY>

- A balanced scorecard consists of an integrated set of performance measures—financial and non-financial—that are derived from the company's strategy and that support the company's strategy throughout the organization.
- **Financial measures tend to be lagging indicators of performance.**
- Because strategies and operating environments are different, each company's balanced scorecard will be different.
- A variety of different performance measures helps guard against potential problems that result from over-reliance on one performance measure. However, too many performance measures may lead to a lack of focus.
- The emphasis is on **continuous improvement** rather than on meeting some preset target or standard.
- An individual should be able to strongly influence the performance measures that appear on his or her scorecard.

## THE BALANCED SCORECARD (continued)

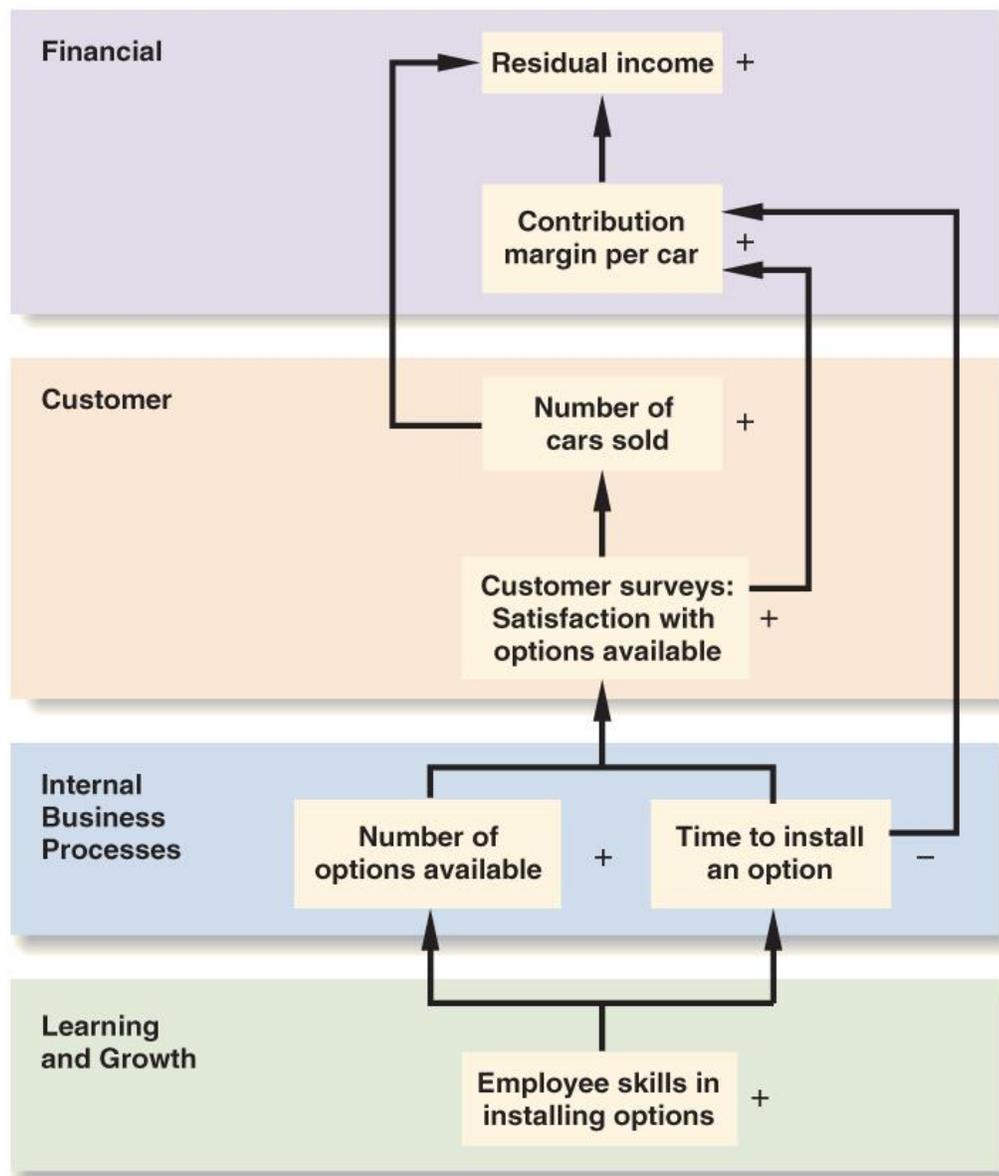


## EXAMPLES OF PERFORMANCE MEASURES FOR BALANCED SCORECARDS

Customer Perspective	
Performance Measure	Desired Change
Customer satisfaction as measured by survey results	+
Number of customer complaints	-
Market share	+
Product returns as a percentage of sales	-
Percentage of customers retained from last period	+
Number of new customers	+
Internal Business Processes Perspective	
Performance Measure	Desired Change
Percentage of sales from new products	+
Time to introduce new products to market	-
Percentage of customer calls answered within 20 seconds	+
On-time deliveries as a percentage of all deliveries	+
Work in process inventory as a percentage of sales	-
Unfavorable standard cost variances	-
Defect-free units as a percentage of completed units	+
Delivery cycle time	-
Throughput time	-
Manufacturing cycle efficiency	+
Quality costs	-
Setup time	-
Time from call by customer to repair of product	-
Percent of customer complaints settled on first contact	+
Time to settle a customer claim	-
Learning and Growth Perspective	
Performance Measure	Desired Change
Suggestions per employee	+
Employee turnover	-
Hours of in-house training per employee	+

## THE BALANCED SCORECARD (continued)

The performance measures on the company's balanced scorecard should tell a coherent story of the cause and effect links that lead from actions by individuals to the objectives of the organization.



## TRANSFER PRICING (Appendix 11A)

**NOTE: Watch video for International issues on Prezi or in Blackboard. <http://www.youtube.com/watch?v=Y7iNOYCA3tY>**

A transfer price is the price charged when one segment (for example, a division) provides goods or services to another segment of the same company.

- Transfer prices are necessary to calculate costs in a cost, profit, or investment center.
- The buying division will naturally want a low transfer price and the selling division will want a high transfer price.
- From the standpoint of the company as a whole, transfer prices involve taking money out of one pocket and putting it into the other.
- An optimal transfer price is one that leads division managers to make decisions that are in the best interests of the company as a whole.

Three general approaches are used in practice to set transfer prices:

1. Negotiated price.
2. Cost-based price.
  - a. Variable cost.
  - b. Full (absorption) cost.
3. Market price.

**NEGOTIATED TRANSFER PRICES**

When division managers are cooperative and understand their businesses, a negotiated transfer price is an excellent solution to the transfer pricing problem. If a transfer is in the best interests of the entire company, division managers bargaining in good faith should be able to find a transfer price that increases the profits of both the divisions.

The lowest acceptable price from the viewpoint of the selling division:

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

The highest acceptable price from the viewpoint of the buying division when the unit can be purchased from an outside supplier:

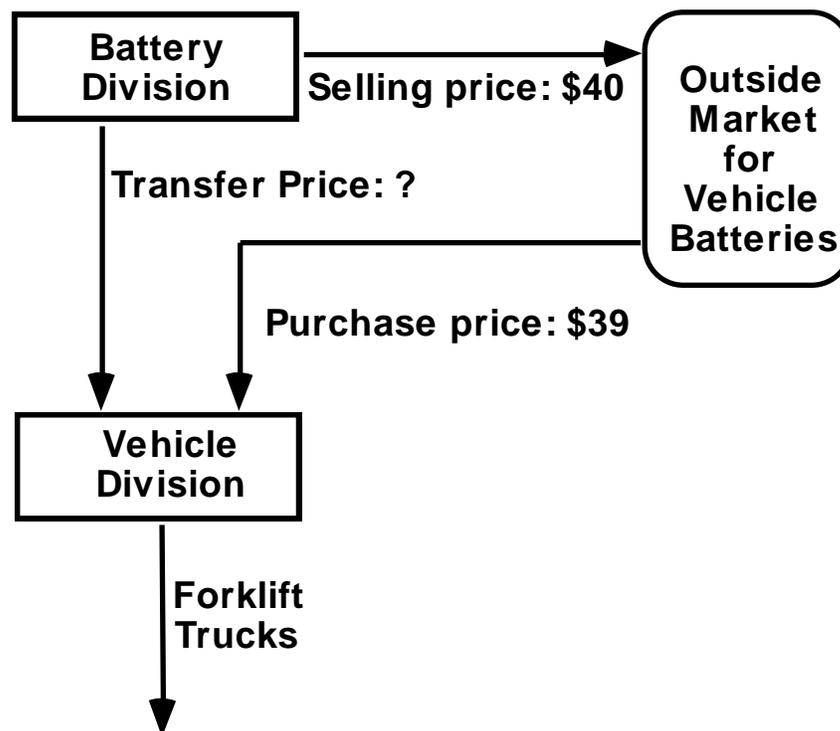
$$\text{Transfer price} \leq \text{Cost of buying from outside supplier}$$

### TRANSFER PRICING EXAMPLES

EXAMPLE: The Battery Division of Barker Company makes a standard 12-volt battery.

Production capacity (number of batteries) .....	300,000
Selling price per battery to outsiders .....	\$40
Variable costs per battery .....	\$18
Fixed costs per battery (based on capacity) ....	\$7

Barker Company has a Vehicle Division that could use this battery in its forklift trucks. The Vehicle Division would like to buy 50,000 batteries per year. It is presently buying these batteries from an outside supplier for \$39 per battery.



## TRANSFER PRICING EXAMPLES (continued)

### Situation 1:

Suppose the Battery Division is operating at capacity.

What is the lowest acceptable transfer price from the viewpoint of the selling division?

$$\text{Transfer price} = \text{Variable cost} + \frac{\text{Total contribution margin on lost sales}}{\text{Number of units transferred}}$$

$$\text{Transfer price} = \$18 + \frac{(\$40 - \$18) \times 50,000}{50,000} = \$18 + (\$40 - \$18) = \$40$$

But, the buying division will not pay more than \$39, the cost from buying the batteries from the outside. So the two managers will not be able to agree to a transfer price and no transfer will voluntarily take place.

$$\text{Transfer price} = \text{Cost of buying from outside supplier} = \$39$$

From the standpoint of the entire company, no transfer *should* take place because the company gives up \$40 in revenues, but saves only \$39 in costs.

## TRANSFER PRICING EXAMPLES (continued)

### Situation 2:

Assume again that the Battery Division is operating at capacity, but suppose that the division can avoid \$4 in variable costs, such as selling commissions, on transfers within the company.

What is the lowest acceptable transfer price from the viewpoint of the selling division?

$$\begin{aligned} \text{Transfer price} &= \text{Variable cost} + \frac{\text{Total contribution margin on lost sales}}{\text{Number of units transferred}} \\ \text{Transfer price} &= (\$18 - \$4) + \frac{(\$40 - \$18) \times 50,000}{50,000} = \$36 \end{aligned}$$

Once again, the buying division will not pay more than \$39, the cost from buying the batteries from the outside.

$$\text{Transfer price} \leq \text{Cost of buying from outside supplier} = \$39$$

In this case an agreement is possible. Any transfer price within the range

$$\$36 \leq \text{Transfer price} \leq \$39$$

will increase the profits of both of the divisions.

From the standpoint of the entire company, this transfer *should* take place because the cost of the transfer is \$36 and the company saves \$39, for a net gain of \$3.

## TRANSFER PRICING EXAMPLES (continued)

### Situation 3:

Refer to the original data. Assume that the Battery Division has enough idle capacity to supply the Vehicle Division's needs without diverting batteries from the outside market, but there is no savings in variable costs on the transfer inside the company.

What is the lowest acceptable transfer price from the viewpoint of the selling division? In this case there are no lost sales.

$$\begin{aligned} \text{Transfer price} &= \text{Variable cost} + \frac{\text{Total contribution margin on lost sales}}{\text{Number of units transferred}} \\ \text{Transfer price} &= \$18 + \frac{\$0}{50,000} = \$18 \end{aligned}$$

Once again, the buying division will not pay more than \$39, the cost of buying the batteries from the outside.

$$\text{Transfer price} \leq \text{Cost of buying from outside supplier} = \$39$$

And again in this case an agreement is possible. Any transfer price within the range

$$\$18 \leq \text{Transfer price} \leq \$39$$

will increase the profits of both of the divisions.

From the standpoint of the entire company, this transfer *should* take place because the cost of the transfer is \$18 and the company saves \$39, for a net gain of \$21.

## TRANSFER PRICING EXAMPLES (continued)

### Situation 4:

The Vehicle Division wants the Battery Division to supply it with 20,000 special heavy-duty batteries.

- The variable cost for each heavy-duty battery would be \$27.
- The Battery Division has no idle capacity.
- Heavy-duty batteries require more processing time than regular batteries; they would displace 22,000 regular batteries from the production line.

What is the lowest acceptable transfer price from the viewpoint of the selling division?

$$\begin{array}{r} \text{Transfer} \\ \text{price} \end{array} \geq \begin{array}{r} \text{Variable} \\ \text{cost} \end{array} + \frac{\text{Total contribution} \\ \text{margin on lost sales}}{\text{Number of units transferred}}$$

$$\begin{array}{r} \text{Transfer} \\ \text{price} \end{array} \geq \$27 + \frac{(\$40 - \$18) \times 22,000}{20,000} = \$27.00 + \$24.20 = \$51.20$$

In this case, the opportunity cost of producing one of the special batteries is \$24.20, the average amount of lost contribution margin.

## **COST-BASED TRANSFER PRICES**

Cost-based transfer prices are easily understood, convenient to use, and do not require negotiation. Unfortunately, cost-based transfer prices have several disadvantages:

- Cost-based transfer prices can lead to bad decisions. (For example, they don't include opportunity costs from lost sales.)
- The only division that will show any profit on the transaction is the one that makes the final sale to an outside party.
- Unless transfers are made at standard cost, cost-based transfer prices provide no incentive for control of costs.

## **MARKET-BASED TRANSFER PRICES**

When the item being transferred has an active outside market, the market price may be a suitable transfer price. However, when the selling division has idle capacity, the market price will overstate the real cost to the company of the transfer and may lead the buying division manager to make bad decisions.

## **~~REASONS FOR CHARGING SERVICE DEPARTMENT COSTS (Appendix 11B)~~**

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

- ~~1. To encourage managers of operating departments to make wise use of services provided by service departments.~~
- ~~2. To provide more complete cost data for making decisions in operating departments.~~
- ~~3. To help measure profitability in operating departments.~~
- ~~4. To put pressure on service departments to operate efficiently.~~

## **~~CHARGING COSTS BY BEHAVIOR~~**

- ~~• Charges should be based on budgeted, not actual, service department costs. Charging based on actual costs would allow the service department to simply pass on any excess costs and would implicitly make the operating departments responsible for how well costs are controlled in the service departments.~~
- ~~• Fixed and variable service department costs should be charged separately.~~
  - ~~• Charges for variable service department costs should be based on whatever causes those costs.~~
  - ~~• Charges for variable service department costs should be determined by multiplying the budgeted rate by the actual level of activity in the using department.~~
  - ~~• Fixed costs are incurred to provide capacity. Therefore, fixed costs should be charged to operating departments in predetermined lump-sum amounts, in proportion to their demands for capacity (the using department's peak period or long-run average needs).~~

**EXAMPLE OF SERVICE DEPARTMENT CHARGES**

EXAMPLE: White Company 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. Data relating for next year follow:

	<i>Percentage of Peak-Period Requirements</i>	<i>Budgeted Hours</i>	<i>Actual Hours</i>
Cutting Department.....	60%	75,000	80,000
Assembly Department.....	40%	50,000	40,000
Total.....	<u>100%</u>	<u>125,000</u>	<u>120,000</u>

Assume that actual Maintenance Department costs for the year are: variable, \$0.65 per machine hour (\$78,000 total); fixed, \$210,000.

*Maintenance Department Charges at the End of the Year*

	<i>Cutting Department</i>	<i>Assembly Department</i>
Variable cost charges:		
\$0.60 per hour × 80,000 hours.	\$ 48,000	
\$0.60 per hour × 40,000 hours.		\$ 24,000
Fixed cost charges:		
\$200,000 × 60% .....	120,000	
\$200,000 × 40% .....		80,000
Total cost charged.....	<u>\$168,000</u>	<u>\$104,000</u>

—As shown below, some of the actual year-end costs are not charged to the operating departments:

	<i>Variable</i>	<i>Fixed</i>
Actual costs incurred .....	\$78,000	\$210,000
Costs charged above .....	<u>72,000</u>	<u>200,000</u>
Spending variance not charged .....	<u>\$ 6,000</u>	<u>\$ 10,000</u>

The spending variance is the responsibility of the Maintenance Department and is not charged to the operating departments.