


STATISTICAL, ECONOMIC AND SOCIAL RESEARCH AND TRAINING CENTRE FOR ISLAMIC COUNTRIES


Cost Management for Healthcare Organizations

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Hospital and Healthcare Facilities Management and Administration Training Program
 September 30 – October 2, 2012, YEMEN


STATISTICAL, ECONOMIC AND SOCIAL RESEARCH AND TRAINING CENTRE FOR ISLAMIC COUNTRIES


Basic Cost Concepts and Cost-Volume-Profit Analysis


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Accounting Information System


- ... provides financial and nonfinancial information for the users.



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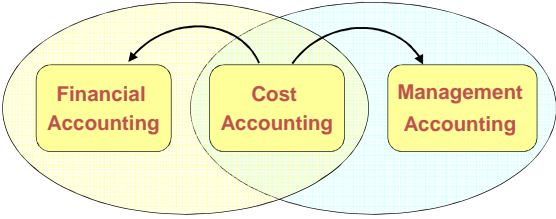
Users of Accounting Information

- **Internal**
 - Managers
 - Employees
- **External**
 - Shareholders/Owner
 - Investors
 - Creditors
 - Suppliers
 - Government
 - Employee Unions
 - Public



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Accounting Information System



External
Internal

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Value Chain

- The term “**value chain**” refers to the sequence of business functions in which usefulness is added to the products or services of an organization.
- The term “**value**” is used because as the usefulness of the product or service is increased, so is its value to the customer.

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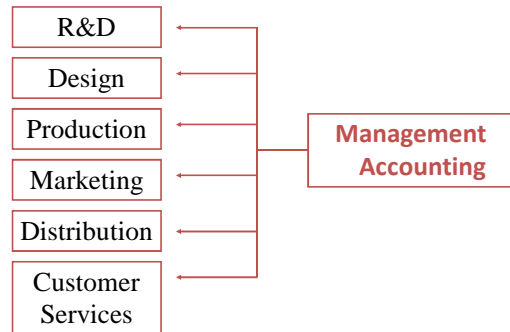
Value Chain

- Management accountants provide decision support for managers in the following six business functions:



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Value Chain



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Type of Businesses

- **Manufacturing**-sector companies – produce and sell their own products (pharmaceutical factory)
- **Merchandising**-sector companies – product resellers (pharmacy)
- **Service**-sector companies (hospital)



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Financial Statements

- **Basic Financial Statements**
 - Statement of Financial Position (Balance Sheet)
 - Income Statement
 - Statement of Cash Flows
- **Other Financial Statements**
 - Schedule of Cost of Goods Sold
 - Statement of Retained Earnings

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Income Statement

- Net Sales
- (-) Cost of Goods Sold
- Gross Margin
- (-) Operating Expenses
- Operating Income
- (-) Interest Expenses
- Net Income Before Tax
- (-) Tax Expenses
- Net Income

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Inventory

- **Direct Materials Inventory**– resources instock and available for use
- **Work-in-Process Inventory** (or progress) – products started but not yet completed. Often abbreviated as WIP
- **Finished Goods Inventory** – products completed and ready for sale
- **Merchandising Inventory**

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Classifying Costs



- By Behavior
 - Fixed
 - Variable
- By Traceability
 - Direct
 - Indirect
- By Function
 - Product
 - Period

Classification of Costs by Traceability

Direct Costs

- Costs that can be easily and conveniently traced to a unit of product or other cost objective.
- Examples:
 - Direct material
 - Direct labor



Indirect Costs

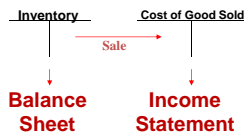
- Costs **cannot** be easily and conveniently traced to a unit of product or other cost objective.
- Example:
 - Manufacturing overhead



Cost Classification by Function

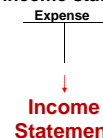
Product costs

Include expenditures that are necessary and integral to finished products. Capitalized on the balance sheet until sold.



Period costs

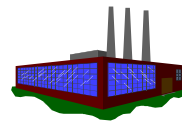
Include expenditures identified more with a time period than with finished products. Expensed on the income statement.



Classification of Costs by Function

Product Costs

- Direct materials
- Direct labor
- Overhead



Period Costs

- R&D
- Marketing & Selling
- Administrative



Cost Classifications by Behavior

Cost Behavior

How a cost will react to changes in the level of business activity.

- Total **variable costs** change when the level of activity changes.
- Total **fixed costs** remain unchanged when the level of activity changes.

Cost Classifications for Predicting Cost Behavior

Behavior of Cost (within the relevant range)

| Cost | In Total | Per Unit |
|----------|---|---|
| Variable | Total variable cost changes as activity level changes. | Variable cost per unit remains the same over wide ranges of activity. |
| Fixed | Total fixed cost remains the same even when the activity level changes. | Fixed cost per unit goes down as activity level goes up. |

Cost Classifications

In the **long run**, all costs are variable, and hence these cost classifications hold only in the **short run**, say, for one year.

Also, no costs are fixed throughout an infinite range of volumes. Thus, the concept of cost classifications according to volume must be applied within some **relevant range** of patient volume.

What are some examples of fixed and variable costs, say, for a hospital's clinical laboratory?

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Cost Structure Example: A Clinic

| Variable Costs Per Visit | | Fixed Costs Per Year | |
|--------------------------|-------------|----------------------|------------------|
| Clinical supplies | \$20 | Facilities | \$ 30,000 |
| Other supplies | 5 | Salaries | 190,000 |
| Variable cost rate | <u>\$25</u> | Overhead | <u>80,000</u> |
| | | | <u>\$300,000</u> |

| Volume | Fixed Costs | Total Variable Costs | Total Costs | Average Cost |
|--------|-------------|----------------------|-------------|--------------|
| 1 | \$300,000 | \$ 25 | \$300,025 | \$300,025 |
| 100 | 300,000 | 2,500 | 302,500 | 3,025 |
| 200 | 300,000 | 5,000 | 305,000 | 1,525 |
| 1,000 | 300,000 | 25,000 | 325,000 | 325 |
| 5,000 | 300,000 | 125,000 | 425,000 | 85 |
| 10,000 | 300,000 | 250,000 | 550,000 | 55 |
| 25,000 | 300,000 | 625,000 | 925,000 | 37 |

Note: The relevant range in this example is unrealistic.

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Income Statement

Consider a volume of **5,000**:

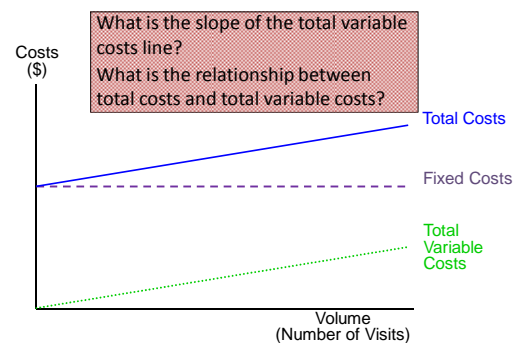
- Fixed costs = \$300,000.
- Variable cost rate = \$25.
- Total variable costs = \$125,000.
- Total costs = \$425,000.
- Average cost per visit = \$85.

Now consider a volume of **10,000**:

- Fixed costs = \$300,000.
- Variable cost rate = \$25.
- Total variable costs = \$250,000.
- Total costs = \$550,000.
- Average cost per visit = \$55.

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Graphical Cost Structure



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Contribution Margin

- Contribution Margin equals sales less variable costs
 $CM = S - VC$
- Contribution Margin per unit equals unit selling price less variable cost per unit
 $CM \text{ per unit} = SP - \text{Unit VC}$
- Contribution Margin also equals contribution margin per unit multiplied by the number of units sold
 $CM = CM \text{ per unit} \times Q$
- Contribution Margin Ratio (percentage) equals contribution margin per unit divided by selling price
 $CM \% = CM \text{ per unit} \div SP$

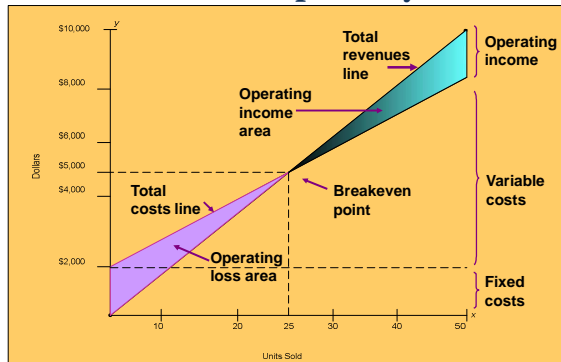
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Contribution Margin Income Statement Derivations

- A horizontal presentation of the Contribution Margin Income Statement:
- $Sales - VC - FC = \text{Operating Income (OI)}$
- $(SP \times Q) - (UVC \times Q) - FC = OI$
- $Q(SP - UVC) - FC = OI$
- $Q(CM \text{ per unit}) - FC = OI$
- Remember this last equation, it will be used again in a moment

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CVP, Graphically



Breakeven Point

- Recall the last equation in an earlier slide:
 $Q (\text{CM per unit}) - \text{FC} = \text{OI}$
- A simple manipulation of this formula, and setting OI to zero will result in the Breakeven Point (quantity):
 $\text{Breakeven Quantity (BEQ)} = \text{FC} \div \text{CM per unit}$
- At this point, a firm has no profit or loss at a given sales level
- If per-unit values are not available, the Breakeven Point may be restated in its alternate format:
- $\text{Breakeven Sales} = \text{FC} \div \text{CM \%}$

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Cost-Volume Profit (CVP) Analysis

■ **Profit analysis**, also called **cost-volume-profit (CVP) analysis**, is a technique used to assess the effects of alternative volume assumptions on costs and profits.

? Why is such information valuable to health services managers?



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CVP Analysis

A Clinic has forecasted the following cost data on the basis of **75,000** expected visits:

| | |
|----------------------|---------------------------|
| Fixed costs | \$4,967,462 |
| Total variable costs | <u>2,113,500</u> |
| Total costs | <u><u>\$7,080,962</u></u> |

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CVP Analysis

What is the variable cost rate?

$$\begin{aligned} \text{Variable cost rate} &= \frac{\text{Total variable costs}}{\text{Volume}} \\ &= \frac{\$2,113,500}{75,000} \\ &= \text{\$28.18 per visit.} \end{aligned}$$

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CVP Analysis

What is Clinic's cost behavior model?

$$\begin{aligned} \text{Total costs} &= \text{Fixed costs} + \text{Total variable costs} \\ &= \$4,967,462 + (\$28.18 \times \text{Volume}). \end{aligned}$$

For example, at **70,000** visits:

$$\begin{aligned} \text{Total costs} &= \$4,967,462 + (\$28.18 \times 70,000) \\ &= \$4,967,462 + \$1,972,600 \\ &= \text{\$6,940,062.} \end{aligned}$$

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CVP Analysis

Cost/Volume Summary:

Volume = 70,000

TC = \$4,967,462 + \$1,972,600 = **\$6,940,062.**

Volume = 75,000 (Base Case)

TC = \$4,967,462 + \$2,113,500 = **\$7,080,962.**

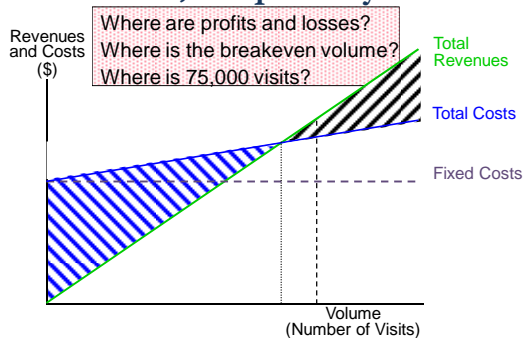
Volume = 80,000

TC = \$4,967,462 + \$2,254,400 = **\$7,221,862.**

CVP Analysis

- ? What do Clinic's managers learn from the data on the previous slide?
- ? Now, suppose that the average revenue per visit is expected to be **\$100**. What does the clinic's cost and revenue structure look like graphically?

CVP, Graphically



Forecasted (Projected) Profit and Loss (P&L) Statement

- The *projected P&L statement* uses cost structure information along with the revenue forecast and projected volume to forecast profitability.
- Although it looks like an income statement, it does not have to follow GAAP.
- Because it is a *forecast*, it can be influenced by managerial actions

Base Case P&L Statement

| | |
|---------------------------------|-------------------|
| Total revenues (\$100 x 75,000) | \$7,500,000 |
| Total VC (\$28.18 x 75,000) | <u>2,113,500</u> |
| Total CM (\$71.82 x 75,000) | \$5,386,500 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u>\$ 419,038</u> |

VC = Variable costs.
CM = Contribution margin.

Base Case P&L Statement

- Note that *base case* total costs equal fixed costs plus total variable costs or \$4,967,462 + \$2,113,500 = **\$7,080,962.**
- Thus, Clinic's *average per visit cost* is \$7,080,962 / 75,000 = **\$94.41.**
- ? What happens to the average cost per visit as volume increases?
- ? Why?

Contribution Margin

The **contribution margin** is defined as the difference between *per visit (unit) revenue* and the *variable cost rate*.

It is the amount of each visit's revenue that is available to:

- First cover fixed costs.
- Flow to profit when fixed costs are covered.

In this illustration, the contribution margin is $\$100 - \$28.18 = \$71.82$.

? What is the **total contribution margin**?

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Breakeven Analysis

Breakeven analysis is performed in many different finance contexts.

Here, it is used to determine the **breakeven volume**, defined as that volume needed for an organization (or service or program) to be financially self-sufficient.

What is the **breakeven** for the Clinic? There are two approaches to answer this question:

- Projected P&L approach
- Graphical approach

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Breakeven Analysis

P&L Approach

$$\begin{aligned} \text{Total revenues} - \text{Total VC} - \text{FC} &= \text{Profit} \\ (\$100 \times V) - (\$28.18 \times V) - \$4,967,462 &= \$0 \\ \$71.82 \times V &= \$4,967,462 \\ V &= \$4,967,462 / \$71.82 = \mathbf{69,165 \text{ visits.}} \end{aligned}$$

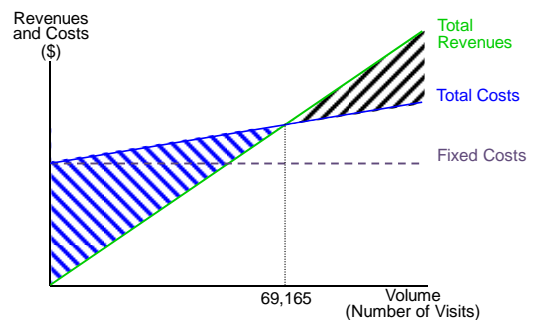
Note that the P&L approach can be recast in a **contribution margin format**.

P&L Approach (Contribution Margin Format)

$$\begin{aligned} \text{CM} \times V &= \text{Fixed costs} \\ \$71.82 \times V &= \$4,967,462 \\ V &= \$4,967,462 / \$71.82 = \mathbf{69,165 \text{ visits.}} \end{aligned}$$

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Graphical Breakeven Analysis



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Breakeven Analysis

What would be the sales volume if the desired profit level is **\$100,000**?

$$\begin{aligned} \text{CM} \times V &= \text{Fixed costs} + \text{Profit} \\ \$71.82 \times V &= \$5,067,462 \\ V &= \$5,067,462 / \$71.82 = \mathbf{70,558 \text{ visits.}} \end{aligned}$$

Note that the breakeven is **69,165** visits.

The additional number of visits needed is **1,393**.

$$1,393 \times \text{CM} = 1,393 \times \$71.82 = \mathbf{\$100,000.}$$

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Profit Analysis Under Discounted FFS

Suppose the Clinic is confronted with a situation in which a payer contributing **5,000** visits wants a **40 percent** discount.

Clinic's managers might want to drop the contract because a **\$60** per visit payment is less than the **\$94.41** average per visit cost.

But further analysis is required.

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P&L Statement with 70,000 Visits

| | |
|---------------------------------|-------------------------|
| Total revenues (\$100 x 70,000) | \$7,000,000 |
| Total VC (\$28.18 x 70,000) | <u>1,973,600</u> |
| Total CM (\$71.82 x 70,000) | \$5,027,400 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u>\$ 39,938</u> |

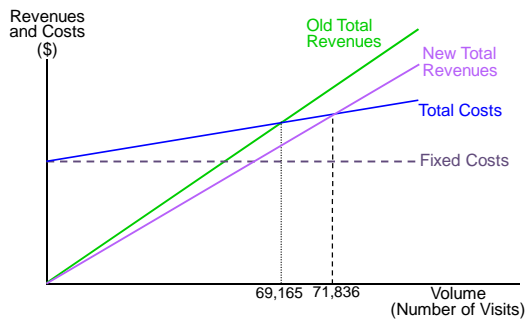
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P&L Statement with Discount Visits

| | |
|---------------------------------------|--------------------------|
| Undiscounted revenue (\$100 x 70,000) | \$7,000,000 |
| Discounted revenue (\$60 x 5,000) | <u>300,000</u> |
| Total revenues (\$97.33 x 75,000) | \$7,300,000 |
| Total VC (\$28.18 x 75,000) | <u>2,113,500</u> |
| Total CM (\$69.15 x 75,000) | \$5,186,500 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u>\$ 219,038</u> |

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Graphical Profit Analysis



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Marginal (Incremental) Analysis

- Suppose the Clinic is approached by a new insurer.
 - This payer is expected to contribute **5,000** additional visits.
 - However, it wants a **40** percent discount, resulting in a revenue of **\$60** per visit.
- At a volume of **80,000**, the clinic's average cost per visit is $\$7,221,862 / 80,000 = \90.27 , so again Clinic's managers might be tempted to say "no."

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Base Case P&L Statement

| | |
|---------------------------------|--------------------------|
| Total revenues (\$100 x 75,000) | \$7,500,000 |
| Total VC (\$28.18 x 75,000) | <u>2,113,500</u> |
| Total CM (\$71.82 x 75,000) | \$5,386,500 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u>\$ 419,038</u> |

VC = Variable costs.
CM = Contribution margin.

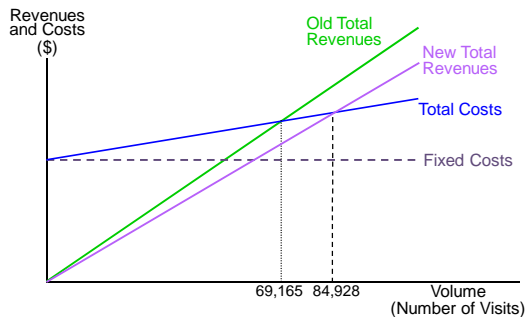
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P&L Statement With Added Volume

| | |
|---------------------------------------|--------------------------|
| Undiscounted revenue (\$100 x 75,000) | \$7,500,000 |
| Discounted revenue (\$60 x 5,000) | <u>300,000</u> |
| Total revenues (\$97.50 x 80,000) | \$7,800,000 |
| Total VC (\$28.18 x 80,000) | <u>2,254,400</u> |
| Total CM (\$69.32 x 80,000) | \$5,545,600 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u>\$ 578,138</u> |

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Graphical Profit Analysis



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Marginal (Incremental) Analysis

- The **marginal cost** of each visit is the **variable cost rate** of **\$28.18** per visit.
- The marginal revenue on the new contract is **\$60** per visit, so the **contribution margin** is $\$60 - \$28.18 = \$31.82$.
- Thus, **5,000** incremental visits would add $5,000 \times \$31.82 = \$159,100$ to the bottom line: $\$419,038 + \$159,100 = \$578,138$.

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Discussion Item

At this point, the numerical analysis indicates that the offer should be accepted. Considering all the factors relevant to the decision, what should the Clinic's managers do?

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Profit Analysis Under Capitation

Capitation changes the way in which profit analysis is conducted

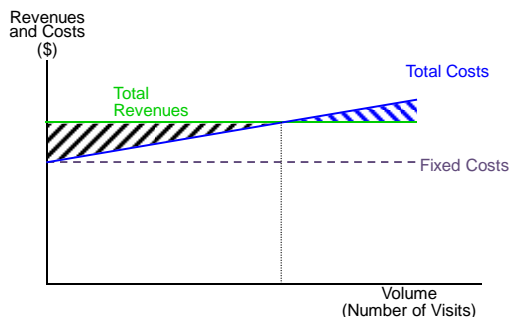
Perhaps the best way to see the effects of capitation is by *graphical analysis*.

We will examine two approaches to graphical analysis:

- In terms of utilization (number of visits).
- In terms of membership (covered lives).

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Analysis Based on Visits



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Analysis Based on Visits

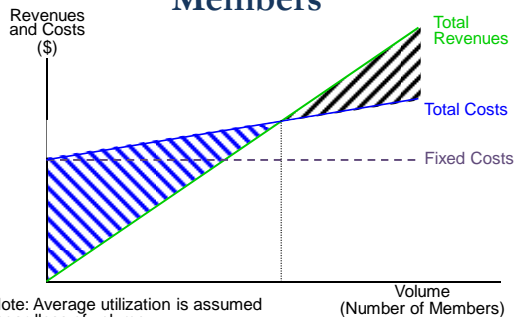
On this graph, the profit and loss areas are **reversed** from the fee-for-service graph.

This "perverse" result occurs because the contribution margin on a per visit basis is negative.

- $\$0 - \$28.18 = -\$28.18$.
- Each additional visit increases costs with no increase in revenues.

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Graphical Analysis Based on Members



Note: Average utilization is assumed regardless of volume.

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Analysis Based on Members

Now, the profit and loss areas are the *same* as on the fee-for-service graph.

On a per member basis, the contribution margin is positive.

- Each additional member contributes positively to profits.
- If per member annual revenue is **\$400** per member and variable costs (based on 4 visits) is $4 \times \$28.18 = \112.72 per year, the contribution margin is $\$400 - \$112.72 = \$287.28$.

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Discussion Items

- ? What do the graphs tell managers about the importance of *utilization management*:
 - ? Under FFS reimbursement?
 - ? Under capitation?
- ? What do the graphs tell about the importance of the *number of members* under capitation?

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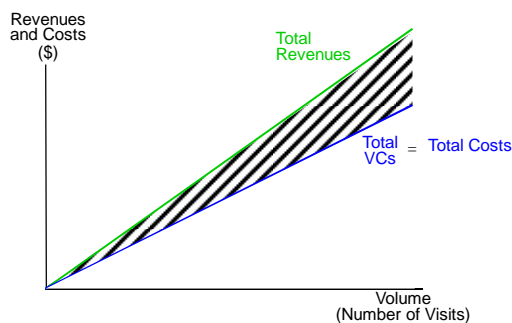
The Impact of Cost Structure on Risk

If reimbursement is tied exclusively to volume (FFS), then the provider's **financial risk** is minimized if *all costs are variable*.

If reimbursement is exclusively capitated, then the provider's financial risk is minimized if *all costs are fixed*.

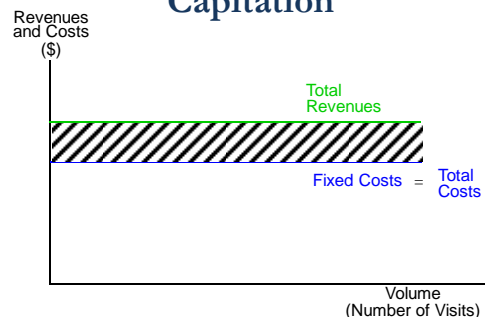
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Graphical Analysis under FFS



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Graphical Analysis Under Capitation



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Cost Allocation Methods: Direct Allocation, Step-Down and Activity Based Costing

2

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Hospital and Healthcare Facilities Management and Administration Training Program
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Basic Cost Terminology

- **Cost** – sacrificed resource to achieve a specific objective
- **Actual Cost** – a cost that has occurred
- **Budgeted Cost** – a predicted cost
- **Cost Object** – anything of interest for which a cost is desired

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Basic Cost Terminology

- **Cost Accumulation** – a collection of cost data in an organized manner
- **Cost Assignment** – a general term that includes gathering accumulated costs to a cost object. This includes:
 - Tracing accumulated costs with a direct relationship to the cost object and
 - Allocating accumulated costs with an indirect relationship to a cost object

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Cost Allocation

- The purpose of **cost allocation** is to assign all overhead costs to the departments that create the need for such costs, typically the *patient service departments*.
- To begin, we must define two terms used in cost allocation. Then, we will illustrate two methods of cost allocation.

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Cost Pool

A **cost pool** is the *overhead amount* to be allocated. In general, a cost pool consists of the direct costs of one overhead department.

However, if the costs of a single overhead department *differ substantially* in nature and are *used in different proportions*, multiple cost pools should be used. For example, Financial Services overhead might be divided as follows:

- Billing and collections cost pool
- Budgeting cost pool

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Cost Driver

A **cost driver** is the *basis* on which the cost pool will be allocated.

For example, the cost driver for facilities overhead (building space depreciation, maintenance, utilities, and so on) might be the *amount of space* used by each patient service department.



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Cost Drivers

The selection of cost drivers is *critical* to the cost allocation process.

Cost drivers should create an allocation that is *highly correlated* with the actual amount of overhead services consumed.

Good cost drivers will have these two important attributes:

- They should be perceived as being *fair*.
- They should promote *organizational cost reduction*.

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Discussion Items

Overhead cost allocation is a “pain.” Why is it necessary?

Suppose a hospital uses *amount of space occupied (square footage)* as the cost driver for the allocation of Housekeeping Services. Does this driver have the attributes of a good driver?



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Traditional Allocation Process

1. Identify the cost pool

Identify the **cost pool**, which is the dollar cost of the overhead activity to be allocated.

To illustrate, assume that a hospital's *Housekeeping Department* has direct costs of **\$100,000**.

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Traditional Allocation Process

2. Determine the cost driver

The **cost driver** is the *basis* on which the overhead costs will be allocated.

Assume that the cost driver for Housekeeping services is the **amount of space occupied**. User departments in total occupy **200,000** square feet of space.

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Traditional Allocation Process

3. Calculate the allocation rate

The **allocation rate** is the numerical value used to make the allocation:

$$\text{Allocation rate} = \frac{\text{Dollars in cost pool}}{\text{Total volume of cost driver}}$$

Here, the allocation rate is $\$100,000 / 200,000 =$ **\$0.50** per square foot of space occupied.

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Traditional Allocation Process

4. Determine the allocation amount

Each user department is then allocated some portion of Housekeeping overhead costs.

Assume the Critical Care Department occupies **10,000** square feet of space. Its allocation would be $\$0.50 \times 10,000 =$ **\$5,000**.

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Allocation Methods

Mechanically, cost allocation can be accomplished in a variety of ways.

Regardless of the method, all overhead costs must ultimately be allocated to the departments that create the need for such costs, which are the *patient service departments*.

There are several allocation methods:

- Direct method
- Step-down method
- Reciprocal method

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Allocation Methods

In the **direct method**, the costs of each support department are allocated *directly to, and only to,* the patient services departments.

In the **step-down method**, *some (but not all)* of the intra support department relationships are recognized. This method is more complex than the direct method, but still manageable.



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Allocation Methods

The **reciprocal method** recognizes *all* of the support department interrelationships, but it requires a system of simultaneous equations or a complex set of iterative calculations.

? Which method is used most commonly in practice?

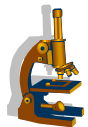
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Direct Method Illustration (Situation)

Consider the *direct cost allocation system* used at Mercy Hospital.

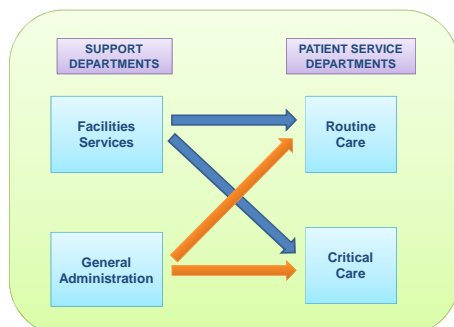
To simplify the illustration, we have reduced the number of departments to four:

- Support (overhead) departments
 - Facilities Services
 - General Administration
- Patient service departments
 - Routine Care
 - Critical Care



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Direct Allocation



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Direct Method Illustration (Situation Cont.)

Mercy uses the following cost drivers:

- The cost driver for the **Facilities Services** cost pool is the *amount of space* used by each patient service department.
- The cost driver for the **General Administration** cost pool is the *amount of revenue* generated by each patient service department.

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Direct Method Illustration (Data)

Projected Revenues by Patient Service Department

| | |
|----------------|---------------------|
| Routine Care | \$22,000,000 |
| Critical Care | <u>5,000,000</u> |
| Total revenues | <u>\$27,000,000</u> |

Projected Costs for All Departments:

Patient Service Departments (Direct Costs)

| | |
|--------------------|---------------------|
| Routine Care | \$ 8,300,000 |
| Critical Care | <u>3,300,000</u> |
| Total direct costs | <u>\$11,600,000</u> |

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Direct Method Illustration (Data)

Projected Costs for All Departments (Cont.):

Support Departments (Direct Costs)*

| | |
|--|---------------------|
| Facilities Services | \$ 8,600,000 |
| General Administration | <u>5,250,000</u> |
| Total overhead costs | <u>\$13,850,000</u> |
| Total costs of both patient and support services | <u>\$25,450,000</u> |
| Projected overall profit | <u>\$ 1,550,000</u> |

*Note: The direct costs of the support departments will become the overhead costs of the patient services departments.

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Direct Method Illustration (Data)

Selected Patient Service Department Data:

| | <u>Square Feet</u> | <u>Revenue</u> |
|---------------|--------------------|---------------------|
| Routine Care | 261,000 | \$22,000,000 |
| Critical Care | <u>39,600</u> | <u>5,000,000</u> |
| Total | <u>300,600</u> | <u>\$27,000,000</u> |

? Why aren't the support departments listed here?

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Direct Method Illustration (Allocation Rates)

Facilities Services

\$8,600,000 in overhead costs to be allocated across 300,600 square feet: $\$8,600,000 / 300,600 \approx \28.61 per sq. ft. This is the **allocation rate**.

General Administration

\$5,250,000 in overhead costs to be allocated across \$27,000,000 in revenue dollars: $\$5,250,000 / \$27,000,000 \approx \$0.194$ per revenue dollar.

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Direct Method Illustration (Allocation Amounts)

From Facilities Services

To Routine Care

$$\$28.61 \times 261,000 = \$7,467,066$$

To Critical Care

$$\$28.61 \times 39,600 = \$1,132,934$$

$$\underline{\underline{\$8,600,000}}$$

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Direct Method Illustration (Allocation Amounts)

From General Administration

To Routine Care

$$\$0.194 \times 22,000,000 = \$4,277,778$$

To Critical Care

$$\$0.194 \times 5,000,000 = \$972,222$$

$$\underline{\underline{\$5,250,000}}$$

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DM Illustration (P&L Statements)

| <u>Routine Care</u> | <u>Margin</u> | |
|----------------------------|---------------------|--------------|
| Revenues | \$22,000,000 | |
| Direct costs | <u>8,300,000</u> | |
| Profit on direct costs | <u>\$13,700,000</u> | <u>62.3%</u> |
| Indirect costs: | | |
| Facilities Services | 7,467,066 | |
| General Administration | <u>4,277,778</u> | |
| Profit on total(full)costs | <u>\$ 1,955,156</u> | <u>8.8%</u> |
| <u>Critical Care</u> | | |
| Revenues | \$ 5,000,000 | |
| Direct costs | <u>3,300,000</u> | |
| Profit on direct costs | <u>\$ 1,700,000</u> | <u>34.0%</u> |
| Indirect costs: | | |
| Facilities Services | 1,132,934 | |
| General Administration | <u>972,222</u> | |
| Profit on total(full)costs | <u>-\$ 405,156</u> | <u>-8.1%</u> |

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Discussion Items

Suppose you are the Critical Care department head at Mercy Hospital. Your bonus is dependent upon good financial performance. What would be your reaction to the allocation results?

What would be your first line of defense?

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Step-Down Method Illustration

Now, assume that Mercy Hospital uses the *step-down method*.

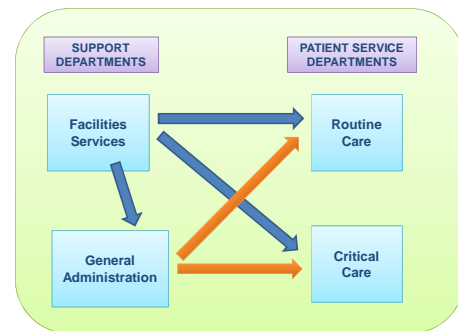
Assume the same cost drivers:

- Amount of space for Facilities Services.
- Salary dollars for General Administration.

Mercy's managers conclude that Facilities Services provides more support to General Administration than vice versa.

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Step Down Allocation



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Step-Down Method Illustration (Data)

Selected Department Data:

| | Square Feet | Salary Dollars |
|------------------------|----------------|---------------------|
| Routine Care | 261,000 | \$ 8,148,000 |
| Critical Care | 39,600 | 2,035,000 |
| General Administration | <u>15,000</u> | --- |
| Total | <u>315,600</u> | <u>\$10,183,000</u> |

? What is the difference here from the direct method?

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Step-Down Illustration (Initial Allocation Rate)

Facilities Services

\$8,600,000 to be allocated across 315,600 square feet: $\$8,600,000 / 315,600 \approx \27.25 per square foot.

? How does this allocation rate differ from the one used in the direct method?

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Step-Down Illustration (Initial Allocation)

From *Facilities Services*

To *General Administration*

$$\$27.25 \times 15,000 = \$ 408,745$$

To *Routine Care*

$$\$27.25 \times 261,000 = \$7,112,167$$

To *Critical Care*

$$\$27.25 \times 39,600 = \underline{\$1,079,088}$$

\$8,600,000

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Step-Down Illustration (Second Allocation Rate)

General Administration

$\$5,250,000 + \$408,745 = \$5,658,745$ to be allocated across $\$10,183,000$ in salaries: $\$5,658,745 / \$10,183,000 \approx \$0.56$ per dollar.

? How does this allocation rate differ from the one used in the direct method?

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Step-Down Illustration (Second Allocation)

From *General Administration*

To *Routine Care*

$$\$0.56 \times 8,148,000 = \$4,527,885$$

To *Critical Care*

$$\$0.56 \times 2,035,000 = \underline{\$1,130,860}$$

\$5,658,645

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Step-Down (P&L Statements)

Routine Care

| | |
|-------------------------------|---------------------|
| Revenues | \$22,000,000 |
| Direct costs | 8,300,000 |
| Indirect costs | |
| <i>Facilities Services</i> | 7,112,167 |
| <i>General Administration</i> | <u>4,527,885</u> |
| Projected profit | <u>\$ 2,059,948</u> |

Critical Care

| | |
|-------------------------------|---------------------|
| Revenues | \$ 5,000,000 |
| Direct costs | 3,300,000 |
| Indirect costs | |
| <i>Facilities Services</i> | 1,079,088 |
| <i>General Administration</i> | <u>1,130,860</u> |
| Projected profit | <u>(\$ 509,948)</u> |

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Step-Down Illustration (Recap)

Routine Care Total Overhead

| | |
|--------------------|---------------------|
| Direct method | \$11,744,844 |
| Step-down method | <u>\$11,640,052</u> |
| Difference (-1.0%) | <u>-\$ 104,792</u> |

Critical Care Total Overhead

| | |
|--------------------|---------------------|
| Direct method | \$ 2,105,156 |
| Step-down method | <u>\$ 2,209,948</u> |
| Difference (+5.0%) | <u>+\$ 104,972</u> |

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Discussion Item

If you were the CEO of Mercy, what would you conclude from the consistency of the results between the direct and step-down methods?



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Activity-Based Costing (ABC)

Unlike traditional cost allocation, which is a *top-down system*, **activity-based costing (ABC)** begins with the *individual activities* that comprise the services provided.

Although it holds great promise for costing (and hence pricing) individual services, it requires more information and is more complex than traditional costing.



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Activity-Based Costing Illustration

Assume a physician practice only does executive physicals, which (ignoring lab tests) consist of three separate activities:

- Patient check in
- Physical examination (minor or major)
- Report and consultation

The following slide contains the ABC analysis for the practice.

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Activity-Based Costing



Allocation Rate Calculation:

| | Annual Costs | Driver | Activity Data | | Total | Allocation Rate |
|----------------|------------------|---------|---------------|-------|---------|-----------------|
| | | | Minor | Major | | |
| Check in | \$ 25,000 | Exams | 1,500 | 500 | 2,000 | \$12.50 |
| Physical exam | 300,000 | Minutes | 60 | 120 | 150,000 | 2.00 |
| Report/Consult | 75,000 | Minutes | 30 | 60 | 75,000 | 1.00 |
| | <u>\$400,000</u> | | | | | |

Service Cost Calculation (Per Exam):

| | Rate | Minor Exam | | Major Exam | |
|----------------|---------|-------------|-----------------|-------------|-----------------|
| | | Consumption | Cost | Consumption | Cost |
| Check in | \$12.50 | 1 | \$ 12.50 | 1 | \$ 12.50 |
| Physical exam | 2.00 | 60 | 120.00 | 120 | 240.00 |
| Report/Consult | 1.00 | 30 | <u>30.00</u> | 60 | <u>60.00</u> |
| Cost per exam | | | <u>\$162.50</u> | | <u>\$312.50</u> |

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STATISTICAL, ECONOMIC AND SOCIAL RESEARCH AND TRAINING CENTRE FOR ISLAMIC COUNTRIES


Decision Making and Relevant Cost Information


3

Assoc. Prof. Dr. Ali Coskun
 Fatih University, Istanbul

Hospital and Healthcare Facilities Management and Administration Training Program
 September 30 – October 2, 2012, YEMEN

Information and the Decision Process

- Top management faces a challenge – that is, making sure that the performance-evaluation model of subordinate managers is consistent with the decision model.
- A decision model is a formal method for making a choice, often involving quantitative and qualitative analysis.



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Five-Step Decision Process

- 1 Gathering information
- 2 Making predictions about future costs
- 3 Choosing an alternative
- 4 Implementing the decision
- 5 Evaluating performance to provide feedback

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Relevance

- Relevant Information has two characteristics:
 - It occurs in the future
 - It differs among the alternative courses of action
- Relevant Costs – expected future costs
- Relevant Revenues – expected future revenues
- Historical costs are past costs that are irrelevant to decision making
 - Also called Sunk Costs

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Types of Information

- Quantitative factors are outcomes that can be measured in numerical terms
- Qualitative factors are outcomes that are difficult to measure accurately in numerical terms, such as satisfaction
 - Are just as important as quantitative factors even though they are difficult to measure

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Terminology

- Incremental Cost – the additional total cost incurred for an activity
- Differential Cost – the difference in total cost between two alternatives
- Incremental Revenue – the additional total revenue from an activity
- Differential Revenue – the difference in total revenue between two alternatives

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Types of Decisions

- One-Time-Only Special Orders
- Insourcing vs. Outsourcing
- Make or Buy
- Product-Mix
- Customer Profitability
- Branch / Segment: Adding or Discontinuing
- Equipment Replacement

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One-Time-Only Special Orders

- Accepting or rejecting special orders when there is idle production capacity and the special orders have no long-run implications
- Decision Rule: does the special order generate additional operating income?
 - Yes – accept
 - No – reject
- Compares relevant revenues and relevant costs to determine profitability

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One-Time-Only Special Order

- Gabriela Company manufactures fancy bath towels.
- The plant has a production capacity of 44,000 towels each month.
- Current monthly production is 30,000 towels.
- The assumption is made that costs can be classified as either variable with respect to units of output or fixed.

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One-Time-Only Special Order

| | Variable Costs <u>Per Unit</u> | Fixed Costs <u>Per Unit</u> |
|---------------------|--------------------------------------|-----------------------------------|
| Direct materials | \$6.50 | \$ -0- |
| Direct labor | 0.50 | 1.50 |
| Manufacturing costs | <u>1.50</u> | <u>3.50</u> |
| Total | \$8.50 | \$5.00 |

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One-Time-Only Special Order

- Total fixed direct manufacturing labor amounts to \$45,000.
- Total fixed overhead is \$105,000.
- Marketing costs per unit are \$7 (\$5 of which is variable).
- What is the full cost per towel?

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One-Time-Only Special Order

| | |
|-----------------------------|-------------|
| Variable (\$8.50 + \$5.00): | \$13.50 |
| Fixed: | <u>7.00</u> |
| Total | \$20.50 |

- A hotel in Puerto Rico has offered to buy 5,000 towels from Gabriela & Co. at \$11.50 per towel for a total of \$57,500.

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One-Time-Only Special Order

- No marketing costs will be incurred for this one-time-only special order.
- Should Gabriela & Co. accept this order?
- Yes!
- Why?



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One-Time-Only Special Order

- The relevant costs of making the towels are \$42,500.
 $\$8.50 \times 5,000 = \$42,500$ incremental costs
 $\$57,500 - \$42,500 = \$15,000$ incremental revenues
 $\$11.50 - \$8.50 = \$3.00$ contribution margin per towel
- Decision criteria:
- Accept the order if the revenue differential is greater than the cost differential.



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Potential Problems with Relevant-Cost Analysis

Avoid incorrect general assumptions about information, especially:

- “All variable costs are relevant and all fixed costs are irrelevant”
- There are notable exceptions for both costs

Problems with using unit-cost data:

- Including irrelevant costs in error
- Using the same unit-cost with different output levels
 - Fixed costs per unit change with different levels of output

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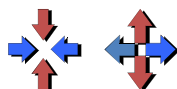
Avoiding Potential Problems with Relevant-Cost Analysis

- Focus on Total Revenues and Total Costs, not their per-unit equivalents
- Continually evaluate data to ensure that they meet the requirements of relevant information

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Insourcing vs. Outsourcing

- Insourcing – producing goods or services within an organization
- Outsourcing – purchasing goods or services from outside vendors
- Also called the “Make or Buy” decision
- Decision Rule: Select the option that will provide the firm with the lowest cost, and therefore the highest profit.



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Qualitative Factors

- Nonquantitative factors may be extremely important in an evaluation process, yet do not show up directly in calculations:
 - Quality Requirements
 - Reputation of Outsourcer
 - Employee Morale
 - Logistical Considerations – distance from plant, etc.

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Make-or-Buy Decisions

- Gabriela & Co. also manufactures bath accessories.
- Management is considering producing a part it needs (#2) or using a part produced by Alec Enterprises.



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Make-or-Buy Decisions

- Gabriela & Co. has the following costs for 150,000 units of Part #2:

| | |
|-------------------|---------------|
| Direct materials | \$ 28,000 |
| Direct labor | 18,500 |
| Mixed overhead | 29,000 |
| Variable overhead | 15,000 |
| Fixed overhead | <u>30,000</u> |
| Total | \$120,500 |

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Make-or-Buy Decisions

- Mixed overhead consists of material handling and setup costs.
- Gabriela & Co. produces the 150,000 units in 100 batches of 1,500 units each.
- Total material handling and setup costs equal fixed costs of \$9,000 plus variable costs of \$200 per batch.

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Make-or-Buy Decisions

- What is the cost per unit for Part #2?
 $\$120,500 \div 150,000 \text{ units} = \$0.8033/\text{unit}$
- Alec Enterprises offers to sell the same part for \$0.55.
- Should Gabriela & Co. manufacture the part or buy it from Alec Enterprises?

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Make-or-Buy Decisions

- The answer depends on the difference in expected future costs between the alternatives.
- Gabriela & Co. anticipates that next year the 150,000 units of Part #2 expected to be sold will be manufactured in 150 batches of 1,000 units each.

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Make-or-Buy Decisions

- Variable costs per batch are expected to decrease to \$100.
- Gabriela & Co. plans to continue to produce 150,000 next year at the same variable manufacturing costs per unit as this year.
- Fixed costs are expected to remain the same as this year.

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Make-or-Buy Decisions

- What is the variable manufacturing cost per unit?

| | |
|-------------------|---------------|
| Direct material | \$28,000 |
| Direct labor | 18,500 |
| Variable overhead | <u>15,000</u> |
| Total | \$61,500 |

$\$61,500 \div 150,000 = \0.41 per unit

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Make-or-Buy Decisions

- Expected relevant cost to make Part #2:

| | |
|------------------------------|----------------|
| Manufacturing | \$61,500 |
| Material handling and setups | <u>15,000*</u> |
| Total relevant cost to make | \$76,500 * |
- $150 \times \$100 = \$15,000$
- Cost to buy: $(150,000 \times \$0.55) = \$82,500$
- Gabriela & Co. will save \$6,000 by making the part.

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Make-or-Buy Decisions

- Now assume that the \$9,000 in fixed clerical salaries to support material handling and setup will not be incurred if Part #2 is purchased from Alec Enterprises.
- Should Gabriela & Co. buy the part or make the part?

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Make-or-Buy Decisions

- Relevant cost to make:

| | |
|----------|--------------|
| Variable | \$76,500 |
| Fixed | <u>9,000</u> |
| Total | \$85,500 |
- Cost to buy: \$82,500
- Gabriela would save \$3,000 by buying the part.

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Opportunity Costs

- Opportunity Cost is the contribution to operating income that is forgone by not using a limited resource in its next-best alternative use
 - “How much profit did the firm ‘lose out on’ by not selecting this alternative?”
- Special type of Opportunity Cost: Holding Cost for Inventory. Funds tied up in inventory are not available for investment elsewhere

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Opportunity Costs, Outsourcing, and Constraints

- Assume that if Gabriela buys the part from Alec Enterprises, it can use the facilities previously used to manufacture Part #2 to produce Part #3 for Krysta’s Company.
- The expected additional future operating income is \$18,000.
- What should Gabriela & Co. do?

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Opportunity Costs, Outsourcing, and Constraints

- Gabriela & Co. has three options:
 - 1 Make Part #2 and do not make Part #3 for Krysta.
 - 2 Buy Part #2 and do not make Part #3 for Krysta.
 - 3 Buy the Part #2 and use the facilities to produce Part #3 for Krysta.

Hospital and Healthcare Facilities Management and Administration Training Program, 2012, Yemen 133

Opportunity Costs, Outsourcing, and Constraints

- Expected cost of obtaining 150,000 parts:

| | | |
|--|---|------------------------|
| Buy Part #2 and do not <u>make Part #3</u> | Buy Part #2 and make <u>Part #3</u> | Make <u>Part #2</u> |
| \$82,500 | \$64,500* | \$76,500 |

*\$82,500 – \$18,000 = \$64,500

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Opportunity Costs, Outsourcing, and Constraints

- Opportunity cost is the contribution to income that is foregone (rejected) by not using a limited resource in its next-best alternative use.



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Opportunity Costs, Outsourcing, and Constraints

- Opportunity costs are not recorded in formal accounting records since they do not generate cash outlays.
- These costs also are not ordinarily incorporated into formal reports.

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Opportunity Costs, Outsourcing, and Constraints

- The opportunity cost of holding inventory is the income forgone from tying up money in inventory and not investing it elsewhere.



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Opportunity Costs, Outsourcing, and Constraints

- Carrying costs of inventory can be a significant opportunity cost and should be incorporated into decisions regarding lot purchase sizes for materials.



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Product-Mix Decisions

- The decisions made by a company about which products to sell and in what quantities
- Decision Rule (with a constraint): choose the product that produces the highest contribution margin per unit of the constraining resource
- When multiple constraints exist, optimization techniques such as linear programming can be used in making decisions.

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Product-Mix Decisions Under Capacity Constraints

- What product should be emphasized to maximize operating income in the face of capacity constraints?
- Gabriela & Co. produces Product #2 and Product #3.
- The company has 3,000 machine hours available to produce these products.

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Product-Mix Decisions Under Capacity Constraints

| Per unit | Product #2 | Product #3 |
|---------------------------|-------------|--------------|
| Sales price | \$2.11 | \$14.50 |
| Variable expenses | <u>0.41</u> | <u>13.90</u> |
| Contribution margin | \$1.70 | \$ 0.60 |
| Contribution margin ratio | 81% | 4% |

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Product-Mix Decisions Under Capacity Constraints

- One unit of Product #2 requires 7 machine hours.
- One unit of Product #3 requires 2 machine hours.
- What is the contribution of each product per machine hour?
- Product #2: $\$1.70 \div 7 = \0.24
- Product #3: $\$0.60 \div 2 = \0.30

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Product-Mix Decisions Under Capacity Constraints

- Which product should be emphasized?
- The product with the highest contribution margin per unit of the constraining resource.



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Profitability, Activity-Based Costing, and Relevant Costs

- Companies must often make decisions about adding or discontinuing a product line, branch, or business segment.
- Companies must also make decisions about adding or dropping customers.

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Adding or Dropping Customers

- Decision Rule: Does adding or dropping a customer add operating income to the firm?
 - Yes – add or don't drop
 - No – drop or don't add
- Decision is based on profitability of the customer, not how much revenue a customer generates

Hospital and Healthcare Facilities Management and Administration Training Program, 2012, Yemen 145

Adding or Discontinuing Branches or Segments

- Decision Rule: Does adding or discontinuing a branch or segment add operating income to the firm?
 - Yes – add or don't discontinue
 - No – discontinue or don't add
- Decision is based on profitability of the branch or segment, not how much revenue the branch or segment generates

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Profitability, Activity-Based Costing, and Relevant Costs

- Blowing Rock Furniture supplies specialized furniture to two local retailers – Stevens and Cohen.
- Blowing Rock Furniture has a monthly capacity of 3,000 machine hours.
- Fixed costs are allocated on the basis of revenues.

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Profitability, Activity-Based Costing, and Relevant Costs

| | <u>Stevens</u> | <u>Cohen</u> |
|------------------------|----------------|---------------|
| Revenues | \$200,000 | \$100,000 |
| Variable costs | 70,000 | 60,000 |
| Fixed costs | <u>100,000</u> | <u>50,000</u> |
| Total operating costs | \$170,000 | \$110,000 |
| Operating income | \$ 30,000 | \$ (10,000) |
| Machine-hours required | 2,000 | 1,000 |

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Profitability, Activity-Based Costing, and Relevant Costs

| | <u>Total</u> |
|------------------------|----------------|
| Revenues | \$300,000 |
| Variable costs | 130,000 |
| Fixed costs | <u>150,000</u> |
| Total operating costs | \$280,000 |
| Operating income | \$ 20,000 |
| Machine-hours required | 3,000 |

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Profitability, Activity-Based Costing, and Relevant Costs

- Should Blowing Rock Furniture drop the Cohen business, assuming that dropping Cohen would decrease its total fixed costs by 10%?
- New fixed costs would be: \$150,000 – \$15,000 = \$135,000

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Profitability, Activity-Based Costing, and Relevant Costs

| | <u>Stevens Alone</u> |
|------------------------|----------------------|
| Revenues | \$200,000 |
| Variable costs | 70,000 |
| Fixed costs | <u>135,000</u> |
| Total operating costs | \$205,000 |
| Operating income | \$ (5,000) |
| Machine-hours required | 3,000 |

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Profitability, Activity-Based Costing, and Relevant Costs

- Cohen's business is providing a contribution margin of \$40,000.
- \$40,000 decrease in contribution margin – \$15,000 decrease in fixed costs = \$25,000 decrease in operating income.

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Profitability, Activity-Based Costing, and Relevant Costs

- Assume that if Blowing Rock Furniture drops Cohen's business it can lease the excess capacity to the Perez Corporation for \$50,000.
- Fixed costs would not decrease.
- Should Blowing Rock Furniture lease to Perez?

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Profitability, Activity-Based Costing, and Relevant Costs

- \$50,000 would be Blowing Rock Furniture's opportunity cost of continuing serving Cohen.
- The \$50,000 offsets the \$40,000 contribution of Cohen's business.

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Equipment-Replacement Decisions

- Sometimes difficult due to amount of information at hand that is irrelevant:
 - Cost, Accumulated Depreciation, and Book Value of existing equipment
 - Any potential Gain or Loss on the transaction – a Financial Accounting phenomenon only
- Decision Rule: Select the alternative that will generate the highest operating income

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Equipment-Replacement Decisions

- Assume that Gabriela & Co. is considering replacing a cutting machine with a newer model.
- The new machine is more efficient than the old machine.
- Revenues will be unaffected.

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Equipment-Replacement Decisions

| | Existing Machine | Replacement Machine |
|--------------------------|------------------|---------------------|
| Original cost | \$80,000 | \$105,000 |
| Useful life | 4 years | 4 years |
| Accumulated depreciation | \$50,000 | |
| Book value | \$30,000 | |
| Disposal price | \$14,000 | |
| Annual costs | \$46,000 | \$ 10,000 |

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Equipment-Replacement Decisions

- Ignoring the time value of money and income taxes, should Gabriela replace the existing machine?
- Yes!
- The cost savings per year are \$36,000.
- The cost savings over a 4-year period will be $\$36,000 \times 4 = \$144,000$.
- Investment = $\$105,000 - \$14,000 = \$91,000$
- $\$144,000 - \$91,000 = \$53,000$ advantage of the replacement machine.

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Thank you

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Teşekkür ederim

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