Activity Based Costing
Existing Single Indirect-Cost Pool System

- Cole Corporation manufactures two types of cell phones – a standard type (S) and one complex type with additional functions (C).
- To cost products, Cole currently uses a single indirect-cost rate job costing system.
- The cost objects are the total costs of manufacturing and distributing 80,000 standard type phones (S) and 20,000 of the complex type (C).
Existing Single Indirect-Cost Pool System

- **Standard type (S)**
  - Direct materials: $1,520,000
  - Direct mfg. labor: 800,000
  - Total direct costs: $2,320,000
  - Direct cost per unit: $2,320,000 ÷ 80,000 = $29

- **Complex type (C)**
  - Direct materials: $920,000
  - Direct mfg. labor: 260,000
  - Total direct costs: $1,180,000
  - Direct cost per unit: $1,180,000 ÷ 20,000 = $59
Existing Single Indirect-Cost Pool System

- **Indirect costs** of $2,900,000 are grouped into a single overhead cost pool.
- 50,000 of direct manufacturing labor hours are used as the cost-allocation base.
- What is the indirect cost rate?
  
  $2,900,000 ÷ 50,000 = $58
Existing Single Indirect-Cost Pool System

- Cole uses 36,000 direct manufacturing labor-hours to make S and 14,000 direct manufacturing labor-hours to make C.

- How much indirect costs are allocated to each product?
  - S: $2,088,000
  - C: $812,000

- What is the total cost of standard phones?
  - Direct costs $2,320,000 + Allocated costs $2,088,000 = $4,408,000
  - What is the cost per unit? $4,408,000 ÷ 80,000 = $55.10

- What is the total cost of complex phones?
  - Direct costs $1,180,000 + Allocated costs $812,000 = $1,992,000
  - What is the cost per unit? $1,992,000 ÷ 20,000 = $99.60
Existing Single Indirect-Cost Pool System

- Standard phones sell for $60 each and complex ones for $142 each.

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$60.00</td>
<td>$142.00</td>
</tr>
<tr>
<td>Cost</td>
<td>55.10</td>
<td>99.60</td>
</tr>
<tr>
<td>Income</td>
<td>$ 4.90</td>
<td>$ 42.40</td>
</tr>
<tr>
<td>Margin</td>
<td>8.2%</td>
<td>29.9%</td>
</tr>
</tbody>
</table>
Refining a Costing System

Guidelines for refining a costing system:

- **Direct-cost tracing** – Classify as many of the total costs as direct costs as is economically feasible.

- **Indirect-cost pools** – Expand the number of cost pools until each of these pools is homogeneous.

- **Cost-allocation basis** – Identify the preferred cost-allocation base for each indirect-cost pool.
The sequence of steps to design, produce, and distribute cell phones, whether normal or complex, is as follows:

1. **Design of products and process** – The Design Department designs the tools and defines processes needed (details of the manufacturing operations).

2. **Manufacturing operations** – Cell phones are assembled, finished, and inspected.

3. **Shipping and distribution** – Finished phones are packed and sent to the various customers.
Activity-Based Costing System

- ABC systems refine costing systems by focusing on **individual activities** as the fundamental cost object.
- ABC calculates the costs of individual activities and assigns costs to cost objects such as products and services on the basis of the activities undertaken to produce each product or service.
Activity-Based Costing System

1. Fundamental Cost Objects
2. Activities
3. Assignments to Other Cost Objects
4. Cost of Activities
5. Cost of Product, Service, Customer
Activity-Based Costing System

A cross-functional team at Cole Corporation identified key activities:

- Design products and processes
- Set up assembling machine
- Operate machines to assemble cell phones
- Maintain the machines
- Set up batches of finished phones for shipment.
- Distribute phones to customers.
- Administer and manage all processes at Cole.
### Activity-Based Costing System

- Setup data for the normal and the complex phones:

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity produced</td>
<td>80,000</td>
<td>20,000</td>
</tr>
<tr>
<td>No. produced/batch</td>
<td>250</td>
<td>50</td>
</tr>
<tr>
<td>Number of batches</td>
<td>320</td>
<td>400</td>
</tr>
<tr>
<td>Setup time per batch</td>
<td>2 hours</td>
<td>5 hours</td>
</tr>
<tr>
<td>Total setup hours</td>
<td>640</td>
<td>2,000</td>
</tr>
</tbody>
</table>

- Total setup costs are $409,200.

- What is the setup cost per setup hour?  
  $409,200 ÷ 2,640 hours = $155

- What is the setup cost per direct manufacturing labor hour?  
  $409,200 ÷ 50,000 = $8.184
Activity-Based Costing System

- Cost allocation using direct manufacturing labor-hours:
  - S: $8.184 \times 36,000 = $294,624
  - C: $8.184 \times 14,000 = $114,576
  - Total: $409,200

- Cost allocation using setup-hours:
  - S: $155 \times 640 = $99,200
  - C: $155 \times 2,000 = $310,000
  - Total: $409,200

- How should Cole allocate setup costs?
Setup costs should be allocated on the basis of setup hours.

Why? There is a strong cause-and-effect relationship between setup-related overhead costs and setup-hours.
Cost Hierarchies

- A cost hierarchy is a categorization of costs into different cost pools on the basis of the different types of cost drivers (cost-allocation bases) or different degrees of difficulty in determining cause-and-effect relationships.

- ABC systems commonly use a four-part cost hierarchy to identify cost-allocation bases:
  1. Output unit-level cost
  2. Batch level costs
  3. Product-sustaining costs
  4. Facility-sustaining costs
Output Unit-Level Costs...

- are resources sacrificed on activities performed on each individual unit of product or service.
  - Energy
  - Machine depreciation
  - Repairs
Batch-Level Costs...

- are resources sacrificed on activities that are related to a group of units of product(s) or service(s) rather than to each individual unit of product or service.

  - Setup hours
  - Procurement costs
Product-Sustaining...

or service-sustaining, costs are resources sacrificed on activities undertaken to support individual products or services.

- Design costs
- Engineering costs
Facility-Sustaining Costs...

- are resources sacrificed on activities that cannot be traced to individual products or services but support the organization as a whole.

- General administration
  - Rent
  - Building security
Implementing Activity-Based Costing

Step 1: Identify the chosen cost objects.
  - The objective is to calculate the total costs of designing, assembling, and distributing S and C.
Implementing Activity-Based Costing

**Step 2:** Identify the direct costs of the product.

- Cole identifies direct materials costs and direct manufacturing labor as direct costs.
- Cleaning and maintenance costs of $360,000 are also identified as direct costs of the phones.
- Cleaning and maintenance costs of $360,000 are direct batch-level costs.
- Why? Because these costs consist of workers’ wages for maintenance of machines after each batch of phones is run.
- The old cost system classified cleaning and maintenance costs as part of the $2,900,000 indirect costs.
- Recall that indirect costs were allocated to products using direct manufacturing labor-hours.
## Implementing Activity-Based Costing

**Standard phones (S)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost Hierarchy</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>Unit-level</td>
<td>$1,520,000</td>
</tr>
<tr>
<td>Direct mfg. labor</td>
<td>Unit-level</td>
<td>800,000</td>
</tr>
<tr>
<td>Cleaning &amp; Maintenance</td>
<td>Batch-level</td>
<td>160,000</td>
</tr>
<tr>
<td>Total direct costs</td>
<td></td>
<td>$2,480,000</td>
</tr>
</tbody>
</table>
Implementing Activity-Based Costing

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost Hierarchy</th>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>Unit-level</td>
<td>$920,000</td>
<td></td>
</tr>
<tr>
<td>Direct mfg. labor</td>
<td>Unit-level</td>
<td>260,000</td>
<td></td>
</tr>
<tr>
<td>Cleaning &amp; Maintenance</td>
<td>Batch-level</td>
<td>200,000</td>
<td></td>
</tr>
<tr>
<td>Total direct costs</td>
<td></td>
<td>$1,380,000</td>
<td></td>
</tr>
</tbody>
</table>
Implementing Activity-Based Costing

- **Step 3**: Select the cost-allocation bases to use in allocating indirect costs to the products.

Six activities were identified.
1. Design
2. Machines setups
3. Manufacturing operations
4. Shipment set up
5. Distribution
6. Administration
Implementing Activity-Based Costing

- **Step 4:** Identify the indirect costs associated with each cost-allocation base.
  - Overhead costs incurred are assigned to activities, to the extent possible, on the basis of a cause-and-effect relationship.
  - Total setup costs are $409,200.

- **Step 5:** Compute the rate per unit of each cost allocation base used to allocate indirect costs to the products.
  - Setup hours: \[ \begin{array}{ccc}
  S & C & \text{Total} \\
  640 & 2,000 & 2,640 \\
  \end{array} \]
  - \[ \frac{409,200}{2,640} = \$155 \]
Implementing Activity-Based Costing

- **Step 6:** Compute the indirect costs allocated to the products.
  - Total cost of setup activity:
    - S: $155 \times 640 = $99,200
    - C: $155 \times 2,000 = 310,000
    - Total: $409,200
Implementing Activity-Based Costing

- **Step 7**: Compute the costs of the products by adding all direct and indirect costs assigned to them.

  **S and C would show three direct cost categories.**
  1. Direct materials
  2. Direct manufacturing labor
  3. Cleaning and maintenance

  **S and C would show six indirect cost pools.**
  1. Design
  2. Machine setups
  3. Manufacturing operations
  4. Shipment setup
  5. Distribution
  6. Administration
Activity-Based Management

- ABM describes management decisions that use activity-based costing information to satisfy customers and improve profits.
  - Product pricing and mix decisions
  - Cost reduction and process improvement decisions
  - Design decisions
Product Pricing and Mix Decisions

- ABC gives management insight into the cost structures for making and selling diverse products.
- It provides more accurate product cost information and more detailed information on costs of activities and the drivers of those costs.
Cost Reduction and Process Improvement Decisions

- Manufacturing and distribution personnel use ABC systems to focus on cost reduction efforts.
- Managers set cost-reduction targets in terms of reducing the cost per unit of the cost-allocation base.
Design Decisions

- Management can identify and evaluate new designs to improve performance by evaluating how product and process designs affect activities and costs.
- Companies can work with their customers to evaluate the costs and prices of alternative design choices.
ABC and Department Indirect-Cost Rates

- Many companies have evolved their costing system from using a single cost pool to using separate indirect-cost rates for each department:
  - Design
  - Manufacturing
  - Distribution

- Why?
- Because the cost drivers of resources in each department or sub-department differ from the single, company-wide, cost-allocation base.
- ABC systems are a further refinement of department costing systems.
ABC Systems Are Most Beneficial When...

- significant amounts of indirect costs are allocated using only one or two cost pools.
- all or most costs are identified as output unit-level costs.
- products make diverse demands on resources because of differences in volume, process steps, batch size, or complexity.
- complex products appear to be very profitable and simple products appear to be losing money.
- operations staff have significant disagreements with the accounting staff about the costs of manufacturing and marketing products and services.
Limitations of ABC Systems

- The main limitations of ABC are the measurements necessary to implement the system.
- ABC systems require management to estimate costs of activity pools and to identify and measure cost drivers for these pools.
- Activity-cost rates also need to be updated regularly.
- Very detailed ABC systems are costly to operate and difficult to understand.
The general approach to ABC in the service and merchandising areas is very similar to the approach in manufacturing. Costs are divided into homogeneous cost pools and classified as output unit-level, batch level, product, or service-sustaining and facility sustaining costs. The cost pools correspond to key activities. Costs are allocated to products or customers using activity drivers or cost-allocation bases that have a cause-and-effect relationship with the cost in the cost pool.
True or False ???

- Cost smoothing leads only to undercosting of products and services.

- A company that is undercosting products always makes sales that result in losses.

- When identifying the cost-allocation base for an indirect cost pool, a cause-and-effect criterion should be used whenever possible.

- The only direct costs that can be identified to a cost object under an activity-based costing system are direct materials and direct labor.

- Activity-based management describes management decisions that are made focusing only on how to reduce costs.
Pick your Choice:

- All of the following are part of the activity-based cost system hierarchy except for:
  - direct unit costs
  - batch-level costs
  - product-sustaining costs
  - facility-sustaining costs

- ABC has determined that the shipment setup costs should be accounted for at the batch-level of activities. ABC believes that the costs assigned to the shipment setup for the current period will be $440,000. ABC is estimating that there will be 400 shipments totaling 8,000 units during the current period. How much cost should be allocated to each shipment?
  - $55
  - $110
  - $550
  - $1,100