Cost Allocation

15.501/516 Accounting
Spring 2004

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Traditional Costing System

Direct Costs
- Direct Labor
- Direct Materials

Overhead Costs
- Indirect Labor
- Indirect Materials
- Depreciation

Traced using allocation base eg direct labor hrs, machine hrs

Product Costs

Traced directly

Examples of Overhead Activities
- Purchase order processing
- Receiving/Inventorying materials
- Inspecting materials
- Processing accounts payable
- Facility maintenance
- Scheduling production
- Customer complaints
- Quality inspection/testing
Activity-Based Costing System

**Direct Costs**
- Direct Labor
- Direct Materials

**Overhead Costs**
- Indirect Labor
- Indirect Materials
- Depreciation

**Activities that drive overhead**

**Product Costs**

**Typical Activity Cost Drivers**
- Number of alteration notices per product
- Units produced
- Number of receipts for materials/parts
- Stockroom transfers
- Direct labor hours
- Set-up hours
- Inspection hours
- Facility hours
- Number of customer complaints

**Cost Allocation Example**

Dialglow Corporation manufactures travel clocks and watches. Overhead costs are currently allocated using direct labor hours, but the controller has recommended an activity-based costing system using the following data:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Cost</th>
<th>Cost Driver</th>
<th>Clocks</th>
<th>Watches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Setup</td>
<td>$120,000</td>
<td>No. of setups</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Material Handling &amp; Requisition</td>
<td>30,000</td>
<td>No. of parts</td>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>Packaging &amp; Shipping</td>
<td>60,000</td>
<td>#Units Shipped</td>
<td>45,000</td>
<td>75,000</td>
</tr>
<tr>
<td>Total Overhead</td>
<td>$210,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct labor hours</td>
<td>140,000</td>
<td></td>
<td>35,000</td>
<td>105,000</td>
</tr>
</tbody>
</table>
### Using Traditional Costing System

*Allocate Total OH based on labor hours*

(35,000 hours for travel clocks; 105,000 hours for watches.)

OH Rate: 

\[
\frac{\$210,000}{140,000\text{ hour}} = \$1.50/\text{hour}
\]

OH cost per Travel Clock: 

\[
\frac{\$1.50/\text{hr} \times 35,000\text{ hrs}}{45,000\text{ units}} = \$1.167
\]

OH cost per Watch: 

\[
\frac{\$1.50/\text{hr} \times 105,000\text{ hrs}}{75,000\text{ units}} = \$2.10
\]

### Using ABC

**Allocation of:**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Level</th>
<th>Clocks</th>
<th>Activity</th>
<th>Level</th>
<th>Watches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Setup Costs</td>
<td></td>
<td></td>
<td>Material Handling Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material Handling Costs</td>
<td></td>
<td></td>
<td>Packing/Shipping Costs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Product Costs using ABC:

<table>
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<tr>
<th>Activity</th>
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<th>Watches</th>
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</thead>
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</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing/Shipping</td>
<td></td>
<td></td>
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</table>

Total

Per Unit

### Using ABC

**Allocation of:**

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Product Costs using ABC:

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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total

Per Unit
Using ABC

Allocation of:
Production Setup Costs: \( \frac{120,000}{(10+15)} \text{ setups} = \frac{4,800}{\text{setup}} \)
Material Handling Costs: \( \frac{30,000}{(18+36)} \text{ part numbers} = \frac{555.56}{\text{part}} \)
Packing/shipping Costs: \( \frac{60,000}{(45,000+75,000)} \text{ units} = \frac{0.50}{\text{unit shipped}} \)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Level</th>
<th>Activity</th>
<th>Level</th>
<th>Product Costs using ABC:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Setup</td>
<td>10</td>
<td>Clocks</td>
<td>15</td>
<td>$48,000</td>
</tr>
<tr>
<td>Material Handling</td>
<td>18</td>
<td></td>
<td>36</td>
<td>$10,000</td>
</tr>
<tr>
<td>Packing/Shipping</td>
<td>45,000</td>
<td></td>
<td>75,000</td>
<td>$22,500</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>$80,500</td>
</tr>
<tr>
<td>Per Unit</td>
<td></td>
<td></td>
<td></td>
<td>$129,500</td>
</tr>
</tbody>
</table>
Using ABC

Allocation of:
- Production Setup Costs: \[ \frac{120,000}{10+15} \text{ setups} = \frac{120,000}{25} = 4,800 \text{ setup} \]
- Material Handling Costs: \[ \frac{30,000}{18+36} \text{ part numbers} = \frac{30,000}{54} = 555.56 \text{ part} \]
- Packing/shipping Costs: \[ \frac{60,000}{(45,000+75,000) \text{ units}} = \frac{60,000}{120,000} = 0.50 \text{ unit shipped} \]

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</tr>
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<td>10</td>
</tr>
<tr>
<td>Material Handling</td>
<td>18</td>
</tr>
<tr>
<td>Packing/Shipping</td>
<td>45000</td>
</tr>
<tr>
<td>Total</td>
<td>$80,500</td>
</tr>
<tr>
<td>Per Unit</td>
<td>$1.79</td>
</tr>
</tbody>
</table>

Summary

- Managerial accounting focuses on decision making and control:
  - Decision making: initiating and implementing decisions.
  - Control: ratifying and monitoring decisions.
  - Important: Organizational structure of firm should separate both functions.

- Characteristics of good internal accounting system:
  - Provide information necessary to identify most profitable products.
  - Provide information necessary to identify production inefficiencies to ensure production at minimum cost.
  - Combine measurement of performance with evaluation of performance to create incentives for managers that maximize firm value.

Destin Brass Products Co.

- What does Destin Brass do?

- What is the dilemma that management faces?

- What type of costs does Destin Brass incur?
  - Exhibit 2

- How has it organized its cost system?
Traditional Costing System

- Direct Costs
  - Direct Labor
  - Direct Materials

- Overhead Costs
  - Indirect Labor
  - Indirect Materials
  - Depreciation

Product Costs

Traced directly
Traced using allocation base eg direct labor hrs, machine hrs

Why Allocate?

- Simple alternative to allocation: forego allocation altogether
  - Charge overhead as period expense
  - Evaluate products using contribution margin (CM = price – variable cost / unit)
  - What is the danger?
    - Forget overheads exist while pricing – remember the incentives of the marketing guys
    - Forget overheads exist period! – this would lead to overhead costs spiraling out of control

The Challenge Of Cost Allocation – Alt. 1

- Traditional cost system: See Exhibit 3
  - Practice: Two-stage process
    - All overhead is assigned to production
    - Overhead is assigned to product using DIRECT LABOR $
  - Pros of the system:
    - Simple, i.e., inexpensive
    - Satisfies all the needs to do financial/tax reporting
The Challenge Of Cost Allocation – Alt. 2

- The alternative: See Exhibit 4
  - Different overhead allocation:
    - Material related overhead (no relation with labor cost)
    - Single out set-up labor cost (no relation with labor cost of production run)
    - Remaining overhead: allocate based on machine-hours: machine hours better reflect the use of the resources related to using the (expensive) machines
  - Pros of the system:
    - Still simple, i.e., inexpensive: we have all the info
    - Satisfies all the needs to do financial/tax reporting

Comparison Of Two Systems

- Profitability of products depends on allocation rules

<table>
<thead>
<tr>
<th></th>
<th>Valves</th>
<th>Pumps</th>
<th>Flow C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>$57.78</td>
<td>$81.26</td>
<td>$97.07</td>
</tr>
<tr>
<td>Cost – Alt. 1</td>
<td>$37.56</td>
<td>$63.12</td>
<td>$56.50</td>
</tr>
<tr>
<td>Cost – Alt. 2</td>
<td>$49.00</td>
<td>$58.95</td>
<td>$47.96</td>
</tr>
<tr>
<td>Profit margin – Alt. 1</td>
<td>35%</td>
<td>22%</td>
<td>42%</td>
</tr>
<tr>
<td>Profit margin – Alt. 2</td>
<td>15%</td>
<td>27%</td>
<td>51%</td>
</tr>
</tbody>
</table>

(Alt. 1 = DL$ allocation from Exh. 1
Alt. 2 = Mach. Hrs alloc from Exh. 4)

Comparison Of Two Systems

- Problem?
  - E.g., engineering costs
  - Volume does not cause the costs

- Suggested solution: trace costs to transactions
**Activity-Based Costing**

- **Starting point:**
  - Activities cause costs
  - Activities occur to produce products and services

- **Basis of the ABC system:**
  - Identify activities
  - Trace the costs of resources to the activities consumed
  - Identify activity measures by which the costs of the process vary most directly
  - Trace activity costs to cost objects (e.g., products)

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**Activity-Based Costing System**

- **Direct Costs:**
  - Direct Labor
  - Direct Materials

- **Overhead Costs:**
  - Indirect Labor
  - Indirect Materials
  - Depreciation

- **Activities that drive overhead:**

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**Apply ABC to Destin Brass**

- **Direct Costs:** as before
- **Depreciation:** (270K)
- **Activity related costs**
  - Receiving and Materials Handling (20K and 200K)
  - Packing and Shipping (60K)
  - Engineering (100K)
  - Maintenance (30K)
Implications

- Profit margin by product?

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<td>Alt. 1</td>
<td>35%</td>
<td>22%</td>
<td>42%</td>
</tr>
<tr>
<td>Alt. 2</td>
<td>15%</td>
<td>27%</td>
<td>51%</td>
</tr>
<tr>
<td>ABC</td>
<td>35%</td>
<td>40%</td>
<td>-4%</td>
</tr>
</tbody>
</table>

- Do we better understand the price setting by competitors now?

Implications

- Issues raised by ABC analysis
  - Pumps aren’t so bad!
  - But flow controllers are – negative margins
  - Is the logical conclusion to exit the flow controller market?
    - Are there are hints in the case that prices of flow controllers can be raised further?
    - Are there other issues?
      - Number of production runs
      - Number of components
      - Number of shipments

Implications – Does ABC Over-Penalize Flow Controllers?

- What is Receiving an Materials Handling overhead per unit for Flow Controllers?

- Using Revised Standard Cost (allocation base is total direct materials cost)
  - $10.56

- Using ABC (allocation is based on proportion of transactions)
  - $170,543/4,000 = $42.64!
**Benefits of ABC**

- Very useful in multi-product firms where large overheads exist.
- Forces managers to think about what drives costs.
- Leads to managers to question why certain activities exist in the first place.
- More accurate costing if cost drivers are chosen carefully.

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**Some Facts About ABC Adoption**

- A survey of 178 US plants came up with the following results:
  - 49% committed resources for ABC implementation
  - 25% are considering adoption
  - 5% considered and rejected
  - 21% did not consider
  - Only around 10% actually use ABC in a significant number of operations

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**Problems**

- Different cost drivers result in very different allocations.
- Number of potential cost drivers is large.
- Identification of cost driving activities leads to political squabbles amongst managers and departmental heads.
- Traditional costing systems with carefully chosen allocation bases are simpler and often work as well.
**What Are The Trade-Offs In Cost Allocation?**

- Should be representative of overheads consumed by different products / product lines.
- Should fit the economic purpose for which cost allocations are being used.
- Should be simple and easy to track and maintain.
- The common problem of allocation systems: they are adequate and simple at the time they are put in place but slowly become outdated as businesses and business processes evolve
  - In other words, they are too simple to handle the complexity of new developments over time – Seligman case.

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**Summary**

- When products or services are homogeneous, volume cost drivers are appropriate for allocating overhead
- When a variety of products or services is produced, ABC is more accurate because it traces costs to activities, performed to produce products or services:
  - Costs result from how we do business!
- ABC systems allow strategic evaluation of product design, manufacturing technology, pricing decisions, product line decisions…