

## Cost Allocation

- 15.501/516 **Accounting**
- Spring 2004

- Professor S. Roychowdhury
- Sloan School of Management
- Massachusetts Institute of Technology

May 3, 2004



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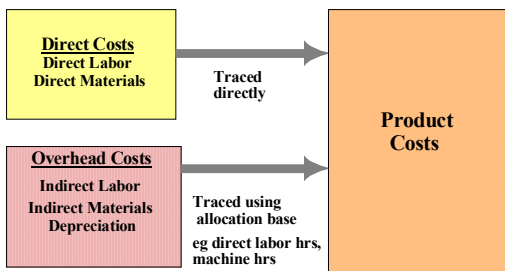
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### Traditional Costing System



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### Examples of Overhead Activities

- Purchase order processing
- Receiving/Inventorying materials
- Inspecting materials
- Processing accounts payable
- Facility maintenance
- Scheduling production
- Customer complaints
- Quality inspection/testing



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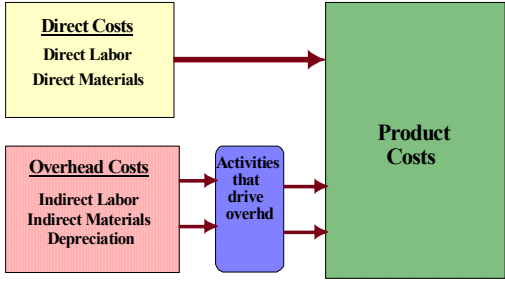
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## Activity-Based Costing System



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## 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



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## 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:

<u>Activity</u>	<u>Cost</u>	<u>Cost Driver</u>	<u>Clocks</u>	<u>Watches</u>
Production Setup	\$120,000	No. of setups	10	15
Material Handling & Requisition	30,000	No. of parts	18	36
Packaging & Shipping	60,000	#Units Shipped	45,000	75,000
Total Overhead	\$210,000			
Direct labor hours	140,000		35,000	105,000



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## Using Traditional Costing System

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**Allocate Total OH based on labor hours**

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

OH Rate:

$$\$210,000 / 140,000 \text{ hours} = \$1.50/\text{hour}$$

OH cost per Travel Clock:

$$(\$1.50/\text{hr} * 35,000 \text{ hrs}) / 45,000 \text{ units} = \mathbf{\$1.167}$$

OH cost per Watch:

$$(\$1.50/\text{hr} * 105,000 \text{ hrs}) / 75,000 \text{ units} = \mathbf{\$2.10}$$




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## Using ABC

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**Allocation of:**

Production Setup Costs:  $\$120,000 / (10+15) \text{ setups} = \$4,800/\text{setup}$

Material Handl'g Costs:  $\$30,000 / (18+36) \text{ part numbers} = \$555.56/\text{part}$

Packing/shipping Costs:  $\$60,000 / (45,000+75,000) \text{ units} = \$0.50/\text{unit shipped}$

Product Costs using ABC:	Activity Level	Clocks	Activity Level	Watches
Production Setup				
Material Handling				
Packing/Shipping				

Total

Per Unit




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## Using ABC

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Packing/shipping Costs:  $\$60,000 / (45,000+75,000) \text{ units} = \$0.50/\text{unit shipped}$

Product Costs using ABC:	Activity Level	Clocks	Activity Level	Watches
Production Setup	10	\$48,000	15	\$72,000
Material Handling				
Packing/Shipping				

Total

Per Unit




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## Using ABC

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Product Costs using ABC:	Activity		Activity	
	Level	Clocks	Level	Watches
Production Setup	10	\$48,000	15	\$72,000
Material Handling	18	10,000	36	20,000
Packing/Shipping				

Total

Per Unit




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## Using ABC

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Product Costs using ABC:	Activity		Activity	
	Level	Clocks	Level	Watches
Production Setup	10	\$48,000	15	\$72,000
Material Handling	18	10,000	36	20,000
Packing/Shipping	45000	22,500	75000	37,500

Total

Per Unit




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## Using ABC

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Production Setup Costs:  $\$120,000 / (10+15) \text{ setups} = \$4,800/\text{setup}$   
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 Packing/shipping Costs:  $\$60,000 / (45,000+75,000) \text{ units} = \$0.50/\text{unit shipped}$

Product Costs using ABC:	Activity		Activity	
	Level	Clocks	Level	Watches
Production Setup	10	\$48,000	15	\$72,000
Material Handling	18	10,000	36	20,000
Packing/Shipping	45000	22,500	75000	37,500

Total

\$80,500

\$129,500

Per Unit




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## Using ABC

### Allocation of:

Production Setup Costs:  $\$120,000 / (10+15) \text{ setups} = \$4,800/\text{setup}$

Material Handl'g Costs:  $\$30,000 / (18+36) \text{ part numbers} = \$555.56/\text{part}$

Packing/shipping Costs:  $\$60,000 / (45,000+75,000) \text{ units} = \$0.50/\text{unit shipped}$

Product Costs using ABC:	Activity		Activity	
	Level	Clocks	Level	Watches
Production Setup	10	\$48,000	15	\$72,000
Material Handling	18	10,000	36	20,000
Packing/Shipping	45000	22,500	75000	37,500
Total		\$80,500		\$129,500
Per Unit		\$1.79		\$1.73



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## 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.



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## Destin Brass Products Co.

➤ What does Destin Brass do?

➤ What is the dilemma that management faces?

➤ What type of costs does Destin Brass incur?

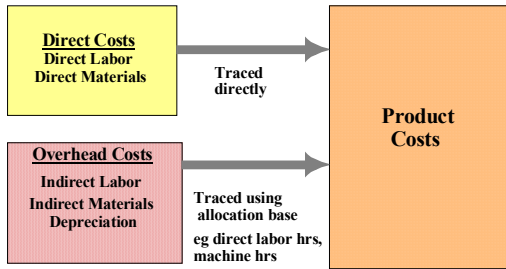
- Exhibit 2

➤ How has it organized its cost system?



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## Traditional Costing System



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## 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

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## 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

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## 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



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## Comparison Of Two Systems

- Profitability of products depends on allocation rules

	Valves	Pumps	Flow C.
Price	\$57.78	\$81.26	\$97.07
Cost – Alt. 1	\$37.56	\$63.12	\$56.50
Cost – Alt. 2	\$49.00	\$58.95	\$47.96
Profit margin – Alt. 1	35%	22%	42%
Profit margin – Alt. 2	15%	27%	51%

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



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## Comparison Of Two Systems

- Problem?
  - E.g., engineering costs
  - Volume does not cause the costs
- Suggested solution: trace costs to transactions



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## 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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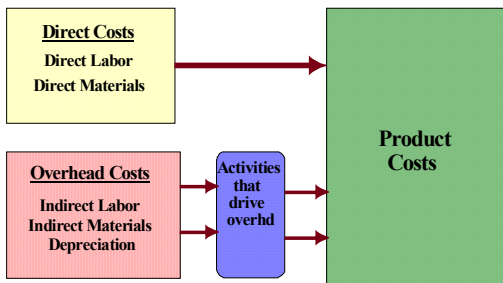
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## Activity-Based Costing System



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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)



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## Implications

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### ➤ Profit margin by product?

	Valves	Pumps	Flow C.
Alt. 1	35%	22%	42%
Alt. 2	15%	27%	51%
ABC	35%	40%	-4%

### ➤ Do we better understand the price setting by competitors now?



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## Implications

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### ➤ 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



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## Implications – Does ABC Over-Penalize Flow Controllers?

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### ➤ 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)

- $\$170,543/4,000 = \$42.64!$



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### Benefits of ABC

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- 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

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- 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

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- 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.



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## What Are The Trade-Offs In Cost Allocation?

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- 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 – Seligram case.



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## Summary

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- 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...



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