

# Introduction To Cost Accounting

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

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- **Sloan School of Management**
- **Massachusetts Institute of Technology**

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## Outline

- Overview of managerial accounting issues
  - Brief discussion of performance evaluation
- Cost accounting terminology
- Cost behavior
- Product costing: traditional method
- Product costing: activity based costing (ABC)



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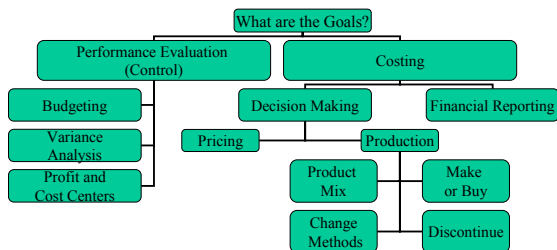
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## Managerial Accounting



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## A few words about Performance Evaluation

- “You get what you pay for”
- Strongly recommended reading: “On the folly of rewarding A, while hoping for B”
  - Doctors and litigation – penalty for type II errors.
    - Where else is this evident? *Auditors*
    - Litigation risk induced conservatism
  - Insurance company – reward for attendance but hoping for performance.
  - Financial markets – focus on quarterly earnings while hoping for long-term growth in profitability



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## Basic Cost Terms: Cost Objects and Drivers

### Cost

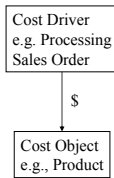
- A sacrifice of resources. Distinguish from “expense.”

### Cost Object

- Any activity or item for which a separate measurement of costs is desired.

### Cost Driver

- Any factor whose change “causes” a change in the total cost of a related cost object. Note: Cost drivers can be factors other than volume



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## Basic Cost Terms: Direct and Indirect Costs

### Direct Costs

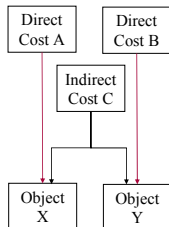
- Costs that can be traced to a given cost object (product, department, etc.) in an economically feasible way.

### Indirect Costs

- Costs that cannot be traced to a given cost object in an economically feasible way. These costs are also known as “overhead”.

### Cost Assignment

- Direct costs are traced to a cost object.
- Indirect costs are *allocated* or assigned to a cost object.



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## Basic Cost Terms: Product and Period Costs

### Product Costs

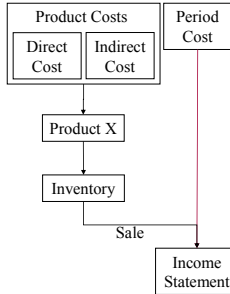
- Costs that "attach" to the units that are produced (i.e., manufacturing costs) and are not reported as expenses until the goods are sold.

### Period costs

- Costs that must be charged against income in the period incurred and cannot be inventoried (e.g., selling and administrative expenses).

### Unit Costs

- Total cost of units divided by units produced.



12

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## Basic Cost Terms: Cost Behavior

### Variable Costs

- Costs that change directly in proportion to changes in the related cost driver

### Fixed Costs

- Costs that remain unchanged for a given time period regardless of changes in the related cost driver.

### Other Common Functions for Cost Behavior

- Semi-variable costs (part variable and part fixed)
- Step costs (aka semi-fixed costs)

### Main Assumptions Needed to Define Fixed and Variable Costs

- Cost object, Time span, Linear functional form
- Relevant range- the band of cost driver activity in which a specific relationship between a cost and a driver holds.



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## Basic Cost Terms

- Product costs can be *Direct* or *Indirect (Overhead)*
- Not all *Direct* costs are variable
  - The depreciation of a special piece of equipment bought to manufacture a single product line.
- Not all *Overheads* are fixed
  - Processing of raw material purchase orders
  - Electricity used in operating production equipment.



14

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## The “Ins” of Inventory Accounting

- What costs are assigned to inventory as products are manufactured?
- GAAP requires **Full Absorption Costing**: the products fully absorb all manufacturing costs, including:
  - Variable manufacturing costs. e.g., direct material
  - Fixed manufacturing costs. e.g., building depreciation
- Results in unitizing fixed costs: convert total fixed costs (TFC) to a unit cost by allocating TFC to the units produced.




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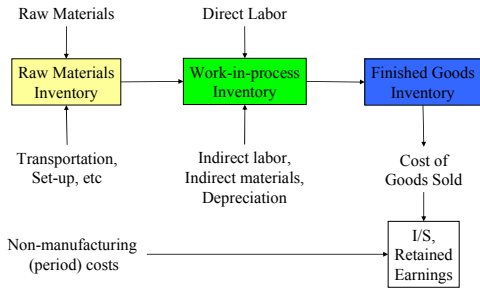
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## The “Ins” and “Outs” of Inventory Accounting




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## Examples of Product Costing

- Electron, Inc. produces 10,000 calculators in one month.
- Variable manufacturing costs are :
  - \$6/unit for material,
  - \$1/unit for direct labor, and
  - \$1/unit for variable overhead.
- Fixed manufacturing overhead is \$50,000/month.
- Unit costs are \$8 (variable) + \$50,000/10,000 (fixed) or \$13/unit.
- How do these costs flow through Inventory Accounts?




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### Product Costing Events

- 11/ 1: Purchase and receive \$60,000 of material (Nov. supply)
- 11/ 2: Requisition ½ of materials to the factory floor (\$30,000)
  
- 11/ 5: Apply labor to the materials (\$5,000)
- 11/ 7: Recognize depreciation expense for the month (\$50,000)
- 11/ 8: Apply variable OH to the materials (\$5,000)
- 11/ 9: Transfer 5,000 completed calculators from WIP to FG Inventory
- 11/10: Ship 2,000 completed calculators to customer




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### How do Costs Flow through Inventory Accounts?

	Cash	RM Inv	WIP Inv	FG Inv	Net PPE =	Wages Payable	RE
Buy Materials							
Requisition ½ Of materials							
Apply labor							
Apply fixed OH (Depreciation)							
Apply variable OH							
Transfer to FG Inv							
Sell 2000 units							




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### How do Costs Flow through Inventory Accounts?

	Cash	RM Inv	WIP Inv	FG Inv	Net PPE =	Wages Payable	RE
Buy Materials	-60	60					
Requisition ½ Of materials							
Apply labor							
Apply fixed OH (Depreciation)							
Apply variable OH							
Transfer to FG Inv							
Sell 2000 units							




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### How do Costs Flow through Inventory Accounts?

	Cash	RM Inv	WIP Inv	FG Inv	Net PPE =	Wages Payable	RE
Buy Materials	-60	60					
Requisition ½ Of materials		-30	30				
Apply labor							
Apply fixed OH (Depreciation)							
Apply variable OH							
Transfer to FG Inv							
Sell 2000 units							



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### How do Costs Flow through Inventory Accounts?

	Cash	RM Inv	WIP Inv	FG Inv	Net PPE =	Wages Payable	RE
Buy Materials	-60	60					
Requisition ½ Of materials		-30	30				
Apply labor			5			5	
Apply fixed OH (Depreciation)							
Apply variable OH							
Transfer to FG Inv							
Sell 2000 units							



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### How do Costs Flow through Inventory Accounts?

	Cash	RM Inv	WIP Inv	FG Inv	Net PPE =	Wages Payable	RE
Buy Materials	-60	60					
Requisition ½ Of materials		-30	30				
Apply labor			5			5	
Apply fixed OH (Depreciation)			50		-50		
Apply variable OH							
Transfer to FG Inv							
Sell 2000 units							



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### How do Costs Flow through Inventory Accounts?

	Cash	RM Inv	WIP Inv	FG Inv	Net PPE =	Wages Payable	RE
Buy Materials	-60	60					
Requisition ½ Of materials		-30	30				
Apply labor			5			5	
Apply fixed OH (Depreciation)			50		-50		
Apply variable OH	-5		5				
Transfer to FG Inv							
Sell 2000 units							



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### How do Costs Flow through Inventory Accounts?

	Cash	RM Inv	WIP Inv	FG Inv	Net PPE =	Wages Payable	RE
Buy Materials	-60	60					
Requisition ½ Of materials		-30	30				
Apply labor			5			5	
Apply fixed OH (Depreciation)			50		-50		
Apply variable OH	-5		5				
Transfer to FG Inv			-65	65			
Sell 2000 units							



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### How do Costs Flow through Inventory Accounts?

	Cash	RM Inv	WIP Inv	FG Inv	Net PPE =	Wages Payable	RE
Buy Materials	-60	60					
Requisition ½ Of materials		-30	30				
Apply labor			5			5	
Apply fixed OH (Depreciation)			50		-50		
Apply variable OH	-5		5				
Transfer to FG Inv			-65	65			
Sell 2000 units				-26			-26



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## Cost Flow Through Inventories

- In particular, note the following
- **On direct labor, the accounting entry is**
  - Dr WIP 5
  - Cr Wages Payable 5
- *Not*
  - Dr Salaries Expense 5
  - Cr Wages Payable 5
- **Similarly, on depreciation for manufacturing facility**
  - Dr WIP 50
  - Cr Accumulated Depreciation 50
- *Not*
  - Dr Depreciation Expense 50
  - Cr Accumulated Depreciation 50



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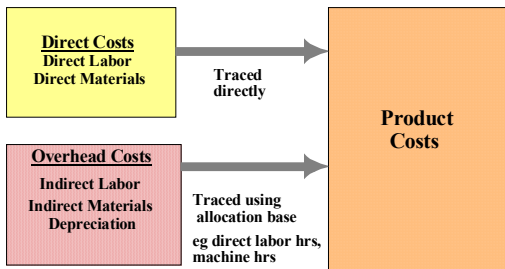
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## Traditional Costing System



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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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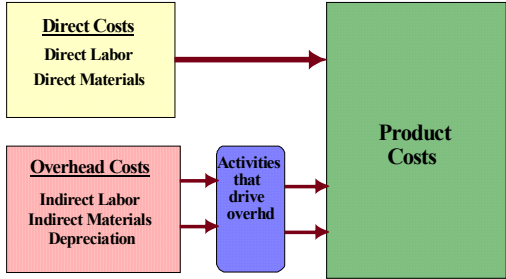
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## Activity-Based Costing System



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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



31

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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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**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	10	\$48,000	15	\$72,000
Material Handling				
Packing/Shipping				

Total

Per Unit



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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		Activity	
	Level	<u>Clocks</u>	Level	<u>Watches</u>
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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**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	<u>Clocks</u>	Level	<u>Watches</u>
Production Setup	10	\$48,000	15	\$72,000
Material Handling	18	10,000	36	20,000
Packing/Shipping	45000	<u>22,500</u>	75000	<u>37,500</u>

Total

Per Unit




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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		Activity	
	Level	<u>Clocks</u>	Level	<u>Watches</u>
Production Setup	10	\$48,000	15	\$72,000
Material Handling	18	10,000	36	20,000
Packing/Shipping	45000	<u>22,500</u>	75000	<u>37,500</u>

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	<u>22,500</u>	75000	<u>37,500</u>
Total		\$80,500		\$129,500
Per Unit		\$1.79		\$1.73



39

## 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.



40