AC 202
Management Accounting

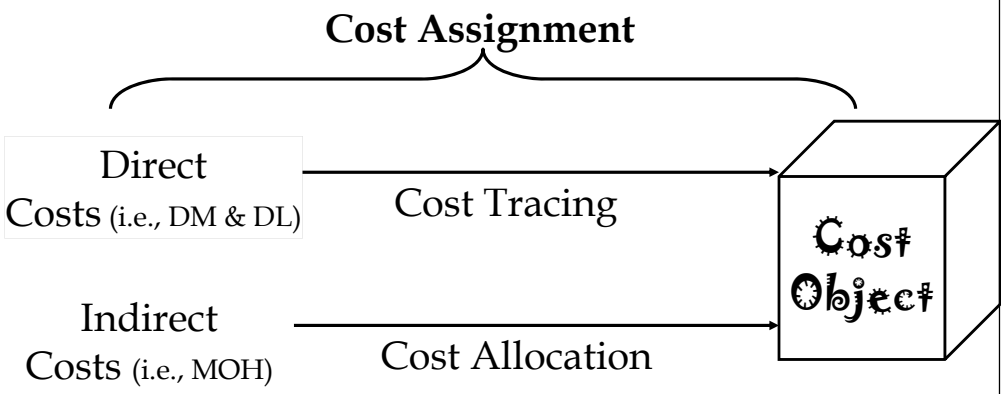
- Cost Allocation
- Activity-Based Costing (ABC)

Assoc. Prof. Dr. Monvika Phadoongsitthi

Activity-Based Costing & Management

- Managerial Accounting (Garrison et. al, 2015)
  - Chapter 7: Activity-Based Costing: A Tool to Aid Decision Making
- After studying this chapter, you should be able to:
  - Understand activity-based costing and how it differs from a traditional costing system.
  - Compute activity rates for cost pools.
  - Assign costs to a cost object.

Basic Costing Terminology



Cost Allocation - The process of assigning indirect costs to cost objects (i.e., products, services, customers, and departments)

Why Allocation?

- Firms that produce more than one product or provide more than one type of service invariably have indirect costs because resources are *shared* by the products or services.
- Indirect costs associated with shared resources *cannot be directly traced to products or services*.
- *Cost Allocation* - The process of assigning indirect costs to cost objects.
- Purpose of cost allocation: to measure cost of the products or services.

Criteria for Cost-Allocation Decisions

❶ *Cause and Effect* – variables are identified that cause resources to be consumed. For example, managers may use machine hour as the variable when allocating the costs of using machine.

❷ *Benefits Received* – the beneficiaries of the outputs of the cost object are charged with costs in proportion to the benefits received. For example, the cost of a corporate-wide advertising program may be allocated on the basis of division revenues.

❸ *Fairness (Equity)* – the basis for establishing a fair price satisfactory between related parties.

❹ *Ability to Bear* – costs are allocated in proportion to the cost object's ability to bear them. Generally, larger or more profitable objects receive proportionally more of the allocated costs

Role of Dominant Criteria

- The *cause-and-effect* and the *benefits-received* criteria are widely used.
- *Fairness* and *ability to bear* are less frequently used.
  - ❖ Fairness is an especially difficult criterion to obtain agreement on.
  - ❖ The ability to bear criterion raises issues related to **cross-subsidization** across users of resources in an organization, i.e., higher income cost object bears higher cost than lower income cost object.

Process of Cost Allocation

❶ Determining the cost object
- ❖ To determine the product, service, or department that is to receive the allocation

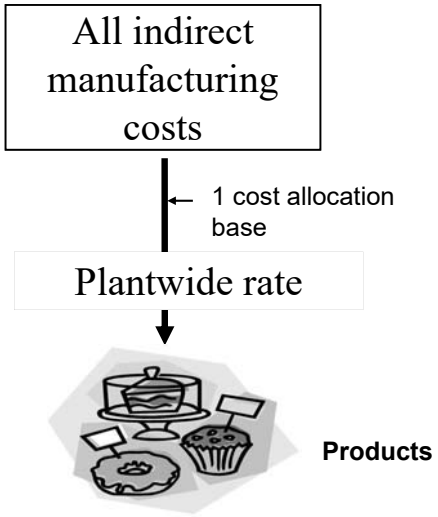
❷ Forming cost pools
- ❖ A grouping of individual costs whose total is allocated using one allocation base
- ❖ The costs in the pool are homogeneous or similar

❸ Selecting an allocation base (Cost Driver)
- ❖ Some characteristic that is common to all of the cost objects

1 cost pool → 1 cost allocation base (cost driver)

Plantwide Overhead Rate

- The plantwide overhead rate is a single overhead rate that a company uses to allocate all of its MOH costs to products or cost objects
- The greatest advantage of the single plantwide OH rate is that it is simple and inexpensive to apply



$$\text{MOH rate} = \frac{\text{Total MOH costs}}{\text{Total plantwide allocation base}}$$

Problems with Traditional Costing

- Allocating overhead costs was simple:
  - Cost allocation bases are volume-related, i.e., DLH , MH, and no. of units produced. However, some costs are not volume-related, i.e., purchasing cost.
  - Use broad averages to allocate costs uniformly regardless of how they are actually incurred
    - Peanut-butter Costing
- The end-result: *overcosting* and *undercosting*

Undercosting and Overcosting Example

Jon, Robert, and Nancy order separate items for lunch.

Jon's order amounts to	$14
Robert consumed	30
Nancy's order is	16
Total	$60

What is the average cost per lunch?

Undercosting and Overcosting Example

$60 ÷ 3 = $20

Jon and Nancy are overcosted.

Robert is undercosted.

- *Overcosting* – a product consumes a low level of resources but is allocated high costs per unit
- *Undercosting* – a product consumes a high level of resources but is allocated low costs per unit

Cross-subsidization

- The results of overcosting one product and undercosting another
- The overcosted product absorbs too much cost, making it seem less profitable than it really is
- The undercosted product is left with too little cost, making it seem more profitable than it really is

Example: Plantwide Overhead Rate

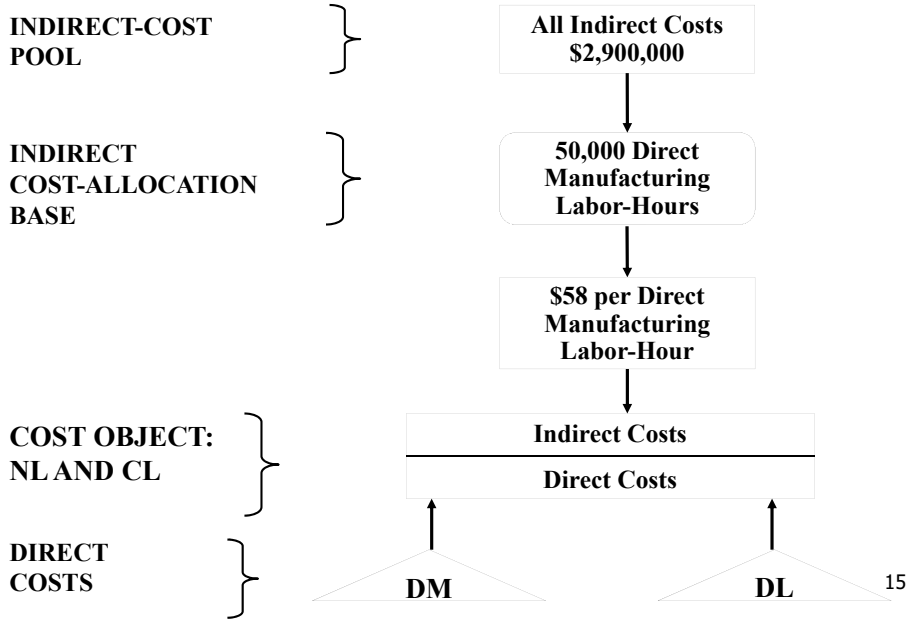
Kole Corporation manufactures a normal lens (NL) and a complex lens (CL).
Cost objects: 80,000 (NL) and 20,000 (CL).
Kole currently uses a single indirect-cost rate job costing system (1 cost pool*).

*Cost pool – a grouping of individual cost items

Example: Plantwide Overhead Rate

	Normal Lenses (NL)	Complex Lenses (CL)
DM	$1,520,000	$ 920,000
DL	800,000	260,000
Total direct costs	$2,320,000	$1,180,000

Example: Plantwide Overhead Rate



Example: Plantwide Overhead Rate

Assume that Kole uses 36,000 direct labor-hours to make NL and 14,000 direct labor-hours to make CL.
How much indirect costs are allocated to each product?

NL:	$58 × 36,000 DLH	= $2,088,000
CL:	$58 × 14,000 DLH	= $812,000

Example: Plantwide Overhead Rate

	Normal Lenses (NL: 80,000 units)	Complex Lenses (CL: 20,000 units)
DM & DL (slide # 14)	$2,320,000	$1,180,000
MOH applied	2,088,000	812,000
Total costs	$4,408,000	$ 1,992,000
Cost per unit	($4,408,000 ÷ 80,000) $55.10	($1,992,000 ÷ 20,000) $99.60

Example: Plantwide Overhead Rate

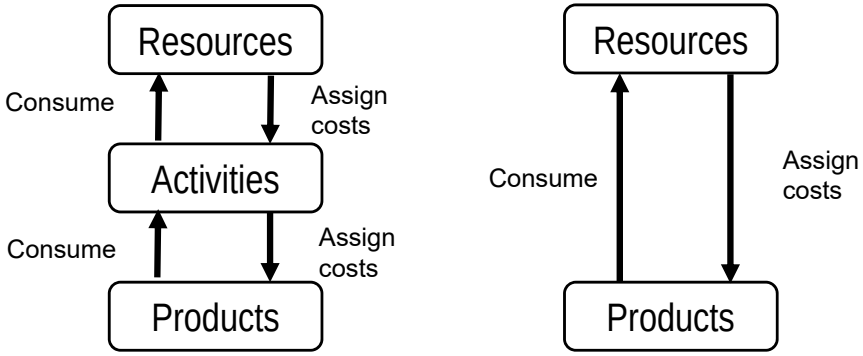
Normal lenses sell for $60 each and complex lenses for $142 each.

	Normal	Complex
Revenue	$60.00	$142.00
Cost	55.10	99.60
Gross margin	$ 4.90	$ 42.40
% GM	8.2%	29.9%

ABC: Two-Stage Assignment

- ***Activity-based costing (ABC)*** first accumulates overheads costs for each organizational activity, and then assigns the costs of the activities to the products, services, or customers (cost objects) causing that activity.
- **Activity** – A task or unit of work with a specified purpose; i.e., designing products, setting up machines, operating machines, and distributing products.

ABC *Traditional Costing*



- In traditional cost accounting, it is assumed that cost objects consume resources whereas in ABC it is assumed that cost objects consume activities.

Activity-Based Costing (ABC)

- ABC refines a costing system by focusing on individual activities as the fundamental cost objects
  - ABC traces more costs as direct costs
  - ABC creates homogeneous cost pools linked to different activities
  - For each activity cost pool, ABC seeks a cost-allocation base (*cost driver*) that has a cause-and-effect relationship with costs in the cost pool
  - Cost drivers are *not necessarily* volume-related

Examples of Costs & Related Cost Drivers

Costs	Related Cost Drivers
Material purchases	No. of purchase order
Material handling	No. of requisition
Employee processing	No. of employees
Machine depreciation	Machine hours, No. of product produced
Quality testing	No. of test, No. of unit tested
Machine Setup	No. of time, Setup hours
Product design	No. of design

Cost Hierarchies

- A cost hierarchy is a categorization of costs into different cost pools
- To identify cost-allocation bases (cost driver), ABC systems classifies activities & costs into one of the following categories:
  - 1. Unit-level activities & costs
  - 2. Batch-level activities & costs
  - 3. Product-sustaining activities & costs
  - 4. Facility-sustaining activities & costs

Unit-Level Activities & Costs

- The *unit-level activities* are performed each time a unit of a product is produced. The number of times unit-level activities (such as inspecting every part) are performed varies according to the number of units produced. The cost of resources used on unit-level activities is called *unit-level cost* because, over time, the cost of this activity increases with additional units of output produced:
  - Electricity used & Electricity costs
  - Machine used & Machine depreciation
  - Machine used & Repair cost
- Note: *DM & DL are not MOH, however, they are considered unit-level costs*

Batch-Level Activities & Costs

- The *batch-level activities* are performed each time a batch of goods is produced. The number of times batch-level activities are performed varies according to the number of batches made. The costs of these activities can be assigned to individual batches (because, over time, the cost of this activity increases with additional batch produced) but they are fixed regardless of the number of units in the batch:
  - Setting up a machine & Setup costs
  - Purchasing materials & Purchasing costs

Product-Sustaining Activities & Costs

- *Product-sustaining activities* are performed as needed to support the production of each different type of product. Product-sustaining activities generate the costs of resources sacrificed to support individual products or services - *Product-sustaining costs.*
  - Performing design change & Design costs
  - Performing engineering change & Engineering costs

Facility-Sustaining Activities & Costs

- *Facility-sustaining activities* support a facility's general manufacturing process. They generate the costs of resources that *cannot* be traced to individual products or services but support the organization as a whole - *Facility-sustaining costs*.
  - General administration & Administrative costs
  - Factory rent & Rent expenses
  - Building security & Security expenses

Refining a Costing System

Existing costing system:	Refining costing system (ABC):
❶Design of products and processes	❶Design of products and processes
	❷ *Set up molding machine*
❷Produce the products	❸Produce the products
	❹ *Maintain and clean molding machine*
	❺ *Set up batches of finished lenses for shipment*
❸Shipping and distribution	❻Distribute lenses to customers
	❼ *Administer and manage all processes*

Implementing Activity-Based Costing

- In addition, the accountants find out that cleaning and maintenance costs of $360,000 are *direct batch-level costs* because these costs consist of workers' wages for cleaning molds after each batch of lenses is run. Assume that:
  - Cleaning and maintenance costs of $160,000 can be traced directly to NL
  - Cleaning and maintenance costs of $200,000 can be traced directly to CL
  - Therefore, cleaning and maintenance costs are direct costs

Implementing Activity-Based Costing

Step 1	Step 2
Identify cost objects	Identify the direct costs of the products
NL CL	❶ Direct material ❷ Direct labor ❸ *Mold cleaning and maintenance**

*It was classified as indirect cost under traditional costing

Implementing Activity-Based Costing

	Cost Hierarchy	NL	CL
Direct materials	Unit-level	$1,520,000	$ 920,000
Direct labor	Unit-level	800,000	260,000
Cleaning and maintenance	*Batch-level*	*160,000*	*200,000*
Total direct costs		$2,480,000	$1,380,000

Implementing Activity-Based Costing

Step 3: Select the cost-allocation bases (*cost drivers*) to use for allocating indirect costs to the products.

Activity	Cost Drivers	Quantity
❶Design	Number of parts	100 parts
❷Setups of molding machines	Setup hours	2,000 hrs.
❸Produce the products	Molding machine usage	12,750 hrs.
❹Shipment setup	Number of shipments	200 shipments
❺Distribution	Cubic feet of packages shipped	67,500 F^3
❻Administration	Direct labor hours	39,750 DLH

Implementing Activity-Based Costing

Step 4: Identify the indirect costs associated with each activity. Overhead costs incurred are assigned to activities, to the extent possible, on the basis of a cause-and-effect relationship.

Activity	Indirect costs
1. Design	$ 450,000
2. Setups of molding machines	$ 300,000
3. Produce the products	$ 637,500
4. Shipment setup	$ 81,000
5. Distribution	$ 391,500
6. Administration	$ 680,000
Total indirect costs	$2,540,000

Implementing Activity-Based Costing

Step 5: Compute the activity rate per unit

Activity	**Activity Rate**	
1. Design	$4,500 per part	($450,000 ÷ 100)
2. Setups of molding machines	$150 per setup hour	($300,000 ÷ 2,000)
3. Produce the products	$50 per machine hour	($637,500 ÷ 12,750)
4. Shipment setup	$405 per shipment	($81,000 ÷ 200)
5. Distribution	$5.8 per cubic foot	($391,500 ÷ 67,500)
6. Administration	$17.1069 per DL hour	($680,000 ÷ 39,750)

Step 6: Compute the indirect costs allocated to the products.

For NL:

Activity	Resource used (Given)		Indirect costs allocated
1. Design	30 parts	($4,500 x 30)	$ 135,000
2. Setups of machines	500 setup hrs.	($150 x 500)	75,000
3. Produce the products	9,000 machine hrs.	($50 x 9,000)	450,000
4. Shipment setup	100 shipments	($405 x 100)	40,500
5. Distribution	45,000 cubic feet	($5.8 x 45,000)	261,000
6. Administration	30,000 DL hrs.	($17.1069 x 30,000)	513,207
			$1,474,707

Step 6: Compute the indirect costs allocated to the products.

For CL:

Activity	Resource used (Given)		Indirect costs allocated
1. Design	70 parts	($4,500 x 70)	$ 315,000
2. Setups of machines	1,500 setup hrs.	($150 x 1,500)	225,000
3. Produce the products	3,750 MH	($50 x 3,750)	187,500
4. Shipment setup	100 shipments	($405 x 100)	40,500
5. Distribution	22,500 cubic feet	($5.8 x 22,500)	130,500
6. Administration	9,750 DL hrs.	($17.1069 x 9,750)	166,793
			$1,065,293

Implementing Activity-Based Costing

Step 7

Compute the costs of the products.
NL and CL would show three direct cost categories.
1. Direct materials
2. Direct manufacturing labor
3. Cleaning and maintenance

NL and CL would show six indirect cost pools.
1. Design
2. Molding machine setups
3. Manufacturing operations
4. Shipment setup
5. Distribution
6. Administration

Implementing ABC
Step 7: Compute product costs

	NL (80,000 units)	CL (20,000 units)
DM	$ 1,520,000	$ 920,000
DL	800,000	260,000
Cleaning and maintenance costs	160,000	200,000
Total direct costs	2,480,000	1,380,000
Indirect costs allocated	1,474,707	1,065,293
Total costs	3,954,707	2,445,293
Unit cost from ABC	✓ **$ 49.43**	✓ **$ 122.26**
Unit cost from old system	**$ 55.10**	**$ 99.60**
	Overcost	***Undercost***

ABC vs. Traditional Costing

- Differences Between ABC and Traditional Product Costs:
  - Traditional costing allocates all manufacturing overhead to products. ABC costing only assigns manufacturing overhead costs *consumed* by products to those products.
  - Traditional costing allocates all manufacturing overhead costs using a volume-related allocation base. ABC costing also uses *non-volume related* allocation bases.
  - Traditional costing disregards selling and administrative expenses because they are assumed to be period expenses. ABC costing directly traces shipping costs to products and includes nonmanufacturing overhead costs caused by products in the activity cost pools that are assigned to products.

Benefits & Limitations of ABC Systems

- Benefits:
  - More accurate product costs which lead to better decisions .
  - Promotes cost control and process improvement as management focuses on value added activities and try to reduce non-value added activities.
- Limitations:
  - Very detailed ABC systems are costly to operate and difficult to understand
  - Cost of implementing the system (identifying the activities, system costs, training costs, etc.)
  - Poorly chosen drivers will produce inaccurate costs, even with ABC