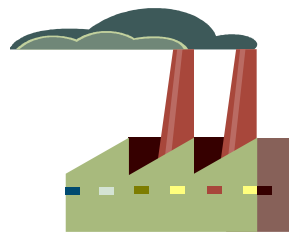


Activity Based Costing

Νίκος Σακκάς



Traditional Costing Systems

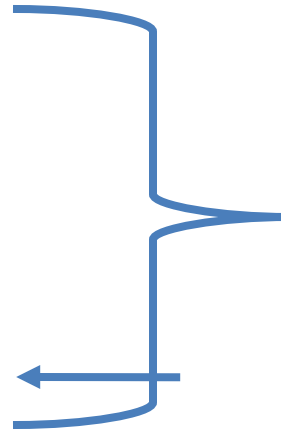
- Product Costs
 - Direct labor
 - Direct materials
 - Factory Overhead
- Period Costs
 - Administrative expense
 - Sales expense

Appear on the income statement when goods are sold, prior to that time they are stored on the balance sheet as inventory.

Appear on the income statement in the period incurred.

Traditional Costing Systems

- Product Costs
 - Direct labor
 - Direct materials
 - Factory Overhead
- Period Costs
 - Administrative expense
 - Sales expense

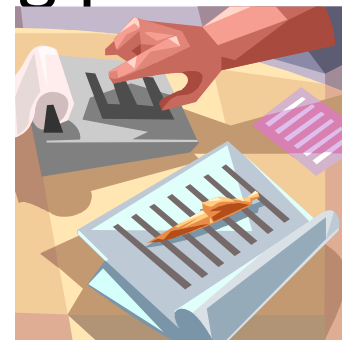


Direct labor and direct materials are easy to trace to products.

The problem comes with factory overhead.

Traditional Costing Systems

- Typically used one rate to allocate overhead to products.
- This rate was often based on direct labor dollars or direct labor hours.
- This made sense, as direct labor was a major cost driver in early manufacturing plants.



Problems with Traditional Costing Systems

- Manufacturing processes and the products they produce are now more complex.
- This results in over-costing or under-costing.
 - Complex products are not allocated an adequate amount of overhead costs.
 - Simple products get too much.

Today's Manufacturing Plants

- Are more complex
- Are often automated
- Often make more than one product
- Use proportionately smaller amount of direct labor making direct labor a poor allocation base for factory overhead.



When the manufacturing process is more complex:

- Then multiple allocation bases should be used to allocate overhead expense.
- In such situations, managers need to consider using activity based costing (ABC).

ABC Definitions

- **Activity based costing** is an approach for allocating overhead costs.
- An **activity** is an event that incurs costs.
- A **cost driver** is any factor or activity that has a direct cause and effect relationship with the resources consumed.



ABC Steps

- Overhead cost drivers are determined.
- Activity cost pools are created.
 - A activity cost pool is a pool of individual costs that all have the same cost driver.
- All overhead costs are then allocated to one of the activity cost pools.

ABC Steps:

- An overhead rate is then calculated for each cost pool using the following formula:
 - Costs in activity cost pool/base
 - The base is, of course, the cost driver
- Overhead costs are then allocated to each product according to how much of each base the product uses.

Let's work an example . . .

- Assume that a company makes widgets
- Management decides to install an ABC system



Overhead Cost Drivers are Determined:

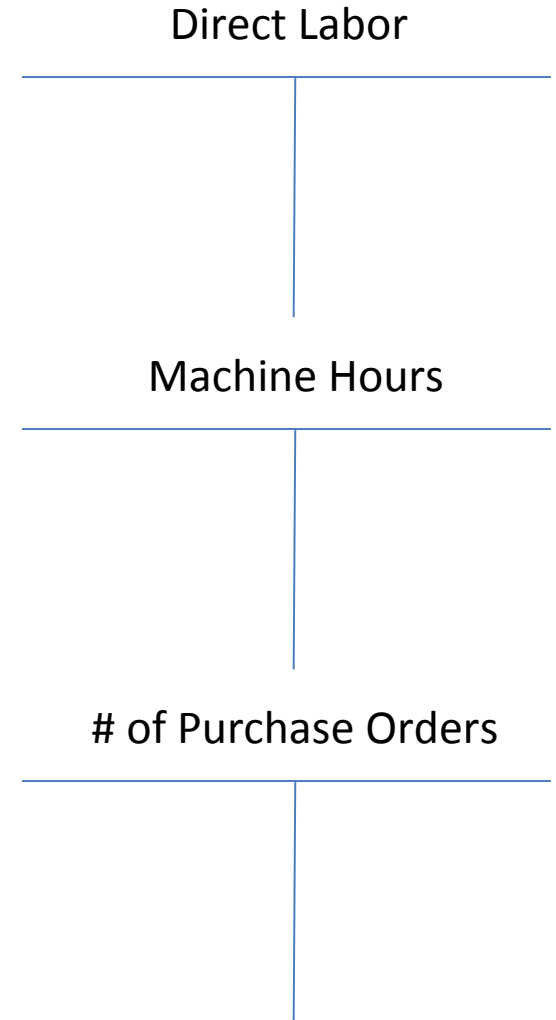
- Management decides that all overhead costs only have three cost drivers—sometimes called activities (obviously a simplification of the real world)
 - Direct labor hours
 - Machine hours
 - Number of purchase orders

All overhead costs are then allocated to one of the activity cost pools.

General Ledger	
Payroll taxes	\$1,000
Machine maintenance	\$500
Purchasing Dept. labor	\$4,000
Fringe benefits	\$2,000
Purchasing Dept. Supplies	\$250
Equipment depreciation	\$750
Electricity	\$1,250
Unemployment insurance	\$1,500



Which overhead costs do you think are driven by direct labor hours?



All overhead costs are then allocated to one of the activity cost pools.

General Ledger	
Payroll taxes	\$1,000
Machine maintenance	\$500
Purchasing Dept. labor	\$4,000
Fringe benefits	\$2,000
Purchasing Dept. Supplies	\$250
Equipment depreciation	\$750
Electricity	\$1,250
Unemployment insurance	\$1,500

Direct Labor	
\$1,000	
2,000	
<u>1,500</u>	
<u>\$4,500</u>	

Machine Hours	

# of Purchase Orders	

Overhead driver by direct labor hours

All overhead costs are then allocated to one of the activity cost pools.

General Ledger	
Payroll taxes	\$1,000
Machine maintenance	\$500
Purchasing Dept. labor	\$4,000
Fringe benefits	\$2,000
Purchasing Dept. Supplies	\$250
Equipment depreciation	\$750
Electricity	\$1,250
Unemployment insurance	\$1,500

Direct Labor	
\$1,000	
2,000	
<u>1,500</u>	
\$4,500	
Machine Hours	
\$ 500	
750	
<u>1,250</u>	
\$2,500	
# of Purchase Orders	

Which overhead costs are driven by machine hours?

All overhead costs are then allocated to one of the activity cost pools.

General Ledger	
Payroll taxes	\$1,000
Machine maintenance	\$500
Purchasing Dept. labor	\$4,000
Fringe benefits	\$2,000
Purchasing Dept. Supplies	\$250
Equipment depreciation	\$750
Electricity	\$1,250
Unemployment insurance	\$1,500

Direct Labor	
\$1,000	
2,000	
<u>1,500</u>	
\$4,500	
Machine Hours	
\$ 500	
750	
<u>1,250</u>	
\$2,500	
# of Purchase Orders	
\$4,000	
<u>250</u>	
\$4,250	

And finally, which overhead costs are driven by # of purchase orders?

An overhead rate is then calculated for each cost pool:

Again the formulas is:

Costs in Activity Cost Pool/Base = rate

Assume the following bases:

Direct labor hours = 1,000

Machine hours = 250

Purchase orders = 100

The ABC rates are:

$\$4,500/1,000 = \4.50 per direct labor hour

$\$2,500/250 = \10 per machine hour

$\$4,250/100 = \42.50 per purchase order

Direct Labor	
\$1,000	
2,000	
<u>1,500</u>	
<u>\$4,500</u>	

Machine Hours	
\$ 500	
750	
<u>1,250</u>	
<u>\$2,500</u>	

# of Purchase Orders	
\$4,000	
<u>250</u>	
<u>\$4,250</u>	

Overhead costs are then allocated to each product according to how much of each base the product uses.

The ABC rates are:

\$4,500/1,000 = \$4.50 per direct labor hour

\$2,500/250 = \$10 per machine hour

\$4,250/100 = \$42.50 per purchase order

Lets assume the company makes two products, Widget A and Widget B:

Let's also assume that each product uses the following quantity of overhead cost drivers:

Base	Widget A	Widget B	Total
Direct labor hours	400	600	1,000
Machine hours	100	150	250
Purchase orders	50	50	100

Notice that all base units are accounted for.

Now let's allocate overhead to Widget A:

	Base A		Rate		Allocated
Direct labor hours	400	\$	4.50	\$	1,800.00

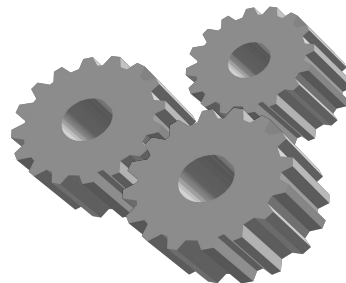
Just like we learned in Accounting 2020, we multiply the base used by the rate.

In this case, 400 hours used to make Widget A is multiplied by the rate of \$4.50. This gives total overhead applied for this activity cost pool of \$1,800 to Widget A.

Continuing the calculation:

Let's do the same thing for the other two rates, to get the total amount of overhead applied to Widget A:

Widget A	Base		Rate		Allocated
Direct labor hours	400	\$	4.50	\$	1,800.00
Machine hours	100	\$	10.00	\$	1,000.00
Purchase orders	50	\$	42.50	\$	2,125.00
Total				\$	4,925.00



Now let's allocate overhead to Widget B:

Let's do the same thing for the other two rates, to get the total amount of overhead applied.

Widget B	Base	Rate	Allocated
Direct labor hours	600	\$ 4.50	\$ 2,700.00
Machine hours	150	\$ 10.00	\$ 1,500.00
Purchase orders	50	\$ 42.50	\$ 2,125.00
Total			\$ 6,325.00

The original overhead to be applied was \$4,500 of direct labor driven overhead + \$2,500 of machine hour driven overhead + \$4,250 of purchase order driven overhead = **\$11,250 total overhead to apply.**

The actual overhead allocated was \$4,925 for Widget A + \$6,350 = **\$11,250 overhead applied.**

Same Problems Traditional Method

- Okay, so what if we had allocated the overhead in this company using traditional cost accounting allocation.
- Let's assume the base is direct labor hours.
- What would be the amount allocated to each product?



Calculation

General Ledger	
Payroll taxes	\$1,000
Machine maintenance	\$500
Purchasing Dept. labor	\$4,000
Fringe benefits	\$2,000
Purchasing Dept. Supplies	\$250
Equipment depreciation	\$750
Electricity	\$1,250
Unemployment insurance	\$1,500

This the total overhead we were given, the total amount is \$11,250 as explained on the previous slide.

Total direct labor hours are 1,000, also given earlier.

Base	Widget A	Widget B	Total
Direct labor hours	400	600	1,000
Machine hours	100	150	250
Purchase orders	40	60	100

Calculation

- The rate would be:
 - OH Rate = Overhead/Direct Labor Hours
 - $\$11,250/1,000 = \11.25 per hour.
- Applying overhead using this rate:
 - Widget A: 400 hours x $\$11.25 = \$4,500$
 - Widget B: 600 hours x $\$11.25 = \$6,750$
 - Total overhead applied = $\$11,250$

Comparison

	Widget A	Widget B	Total
Traditional Method	\$4,500	\$6,750	\$11,250
Activity Based Costing	\$4,925	\$6,325	\$11,250
Difference	-\$425	\$425	-0-

Which is more accurate?

ABC Costing!

Note these are total costs. To get per-unit costs we would divide by the number of units produced.

When do we use ABC costing?

- *When one or more of the following conditions are present:*
- Product lines differ in volume and manufacturing complexity.
- Product lines are numerous and diverse, and they require different degrees of support services.
- Overhead costs constitute a significant portion of total costs.

When do we use ABC costing?

- The manufacturing process or number of products has changed significantly—for example, from labor intensive to capital intensive automation.
- Production or marketing managers are ignoring data provided by the existing system and are instead using “bootleg” costing data or other alternative data when pricing or making other product decisions.

Additional Uses of ABC

- Activity Based Management (ABM)
 - Extends the use of ABC from product costing to a comprehensive management tool that focuses on reducing costs and improving processes and decision making.

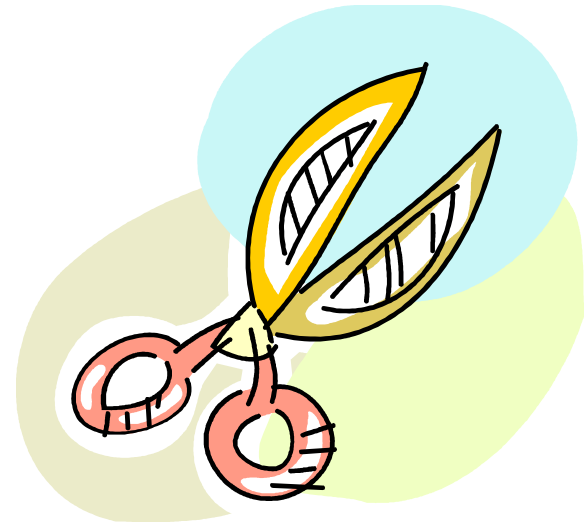


ABM

- ABM classifies all activities as value-added or non-value-added.
 - Value-added activities increase the worth of a product or service to the customer.
 - Example: Addition of a sun roof to an automobile.
 - Non-value added activities don't.
 - Example: The cost of moving or storing the product prior to sale.

The Objective of ABM . . .

- To reduce or eliminate non-value related activities (and therefore costs).
- Attention to ABM is a part of continuous improvement of operations and activities.



Possible Cost Drivers

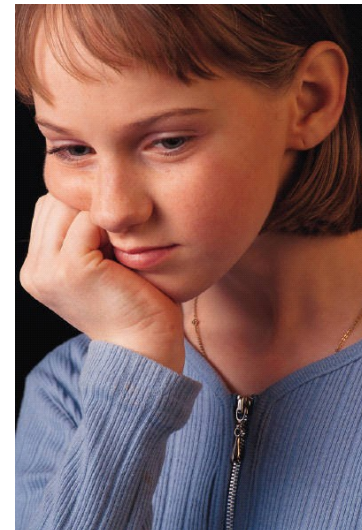
- Machine hours
- Direct labor hours
- Number of setups
- Number of products
- Number of purchase orders
- Number of employees
- Number of square feet

Common Classification System

- **Unit-level activities.** Activities performed for each unit of production.
- **Batch-level activities.** Activities performed for each of bath of products.
- **Product-level activities.** Activities performed in support of an entire product line.
- **Facility-level activities.** Activities required to sustain an entire production process.

Common Classification System

- This system provides a structured way of thinking about relationship between activities and the resources they consume.



Facility Sustaining Activities

- Have no good cost driver
- May or may not be allocated to products depending upon the purpose for which the information is to be used
- Examples
 - Housekeeping
 - Factory yard maintenance

Manufacturing Systems

- Traditional
 - “Just-in-Case.”
 - Inventories of raw materials are maintained just in case some items are of poor quality or key suppliers don’t delivery on time.
 - Push approach manufacturing.
 - Materials are pushed through the manufacturing process.
 - Based on standard costs. Once a standard is reached improvement ceases.

Manufacturing Systems

- Progressive
 - “Just in Time.”
 - Raw materials arrive just in time for use in production.
 - Finished goods are manufactured just in time to meet customer needs.
 - Pull approach manufacturing.
 - Raw materials are not put into the process until the next department requests them.
 - Continuous quality improvement.

Three important elements must exist for JIT systems to work:

- Dependable suppliers who can delivery on short notice.
- Multiskilled workforce who can work in work cells or work stations.
 - One worker may operate several kinds of machines.
- Total quality management. Objective is no defects.

Objectives of JIT

- Reduction or elimination of inventories
- Enhanced production quality
- Reduction or elimination of rework costs
- Production cost savings from improved flow of goods through the process.

Brief Exercise 6 and 7 Will Be Worked Using Excel



The End!

