

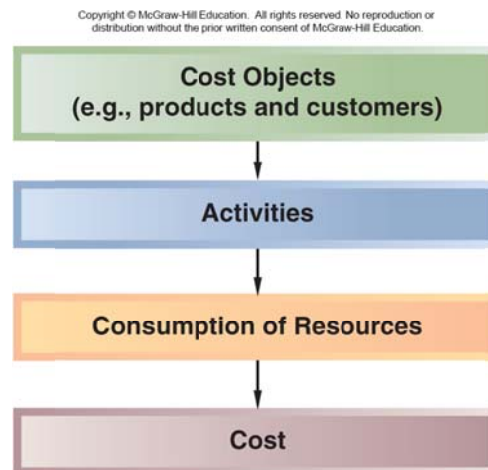
CHAPTER 7

ACTIVITY-BASED COSTING (ABC)

AGENDA

1. The activity-based costing model
2. Differences between traditional costing and activity-based costing
3. Steps for implementing activity-based costing
4. The ABC cost hierarchy
5. An example of activity-based costing
6. Contrasting traditional costing and activity-based costing product costs

I. ACTIVITY-BASED COSTING MODEL



The emphasis is on decision-making and managing activities, not on assigning costs to products for external financial reports.

II. DIFFERENCES BETWEEN TRADITIONAL COSTING AND ACTIVITY-BASED COSTING

In traditional costing systems:

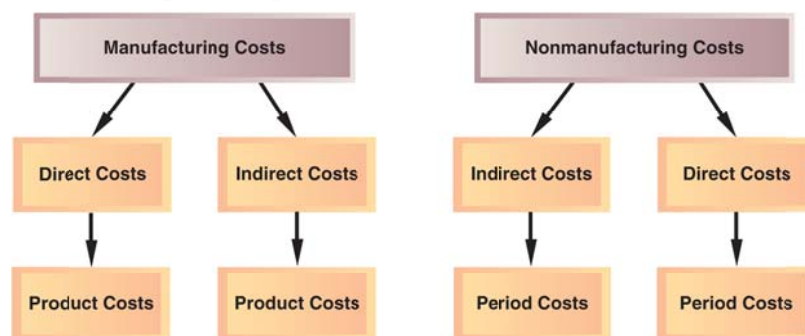
- All manufacturing costs are assigned to products whether or not they are caused by the products.
- Nonmanufacturing costs are not assigned to products—even those nonmanufacturing costs that are caused by the products.
- The entire facility may have only one overhead cost pool and a single measure of activity such as direct labor-hours.
- Predetermined overhead rates are based on estimated costs at the budgeted or expected level of activity.

In activity-based costing:

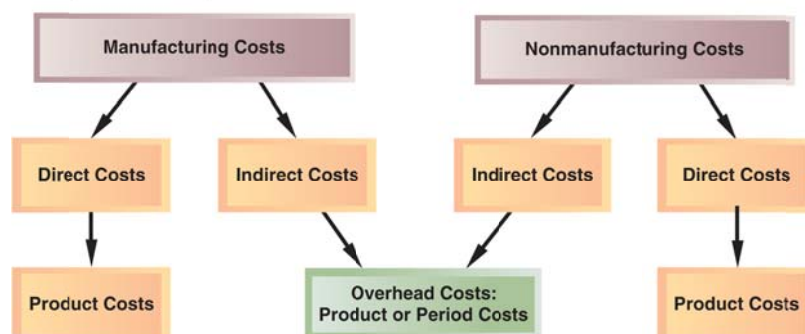
- Nonmanufacturing costs, as well as manufacturing costs, may be assigned to products.
- Some manufacturing costs may be excluded from product costs.
- There are a number of overhead cost pools, each of which has its own unique measure of activity.
- The allocation bases (i.e., measures of activity) often differ from those used in traditional costing.
- The activity rates (i.e., overhead rates) may be based on the level of activity at capacity rather than on the budgeted or expected level of activity.

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Traditional Absorption Costing:



Activity-Based Costing:



STEPS FOR IMPLEMENTING ACTIVITY-BASED COSTING

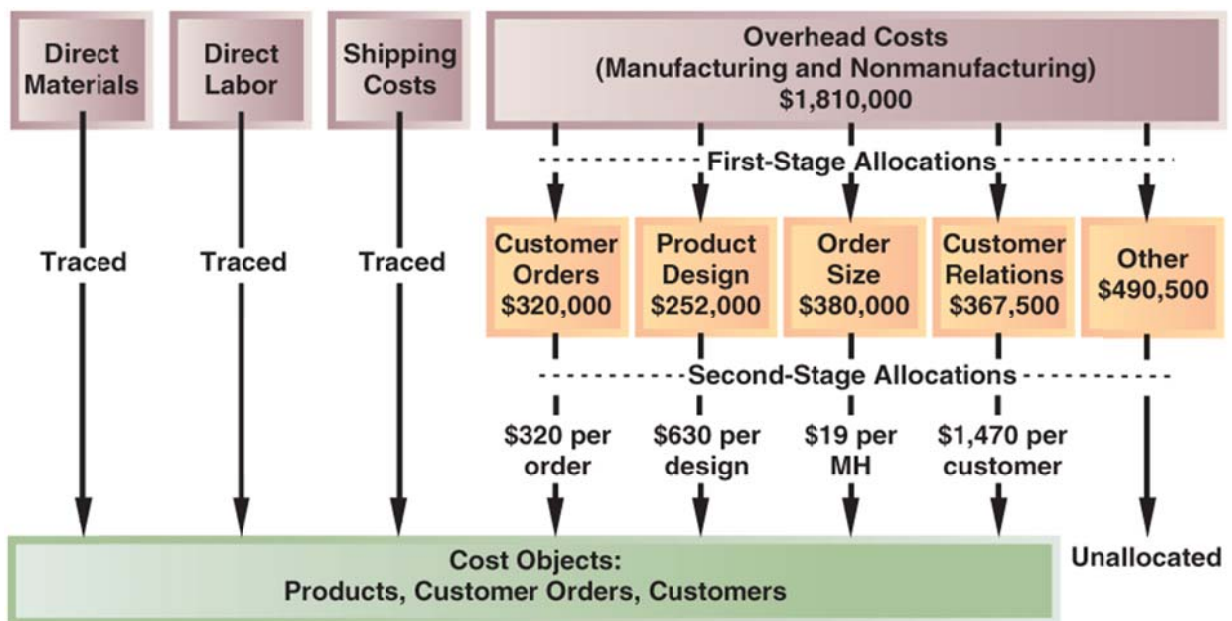
1. Define activities, activity cost pools, and activity measures.
2. Assign overhead costs to activity cost pools.
3. Calculate activity rates.
4. Assign overhead costs to cost objects using the activity rates and activity measures.
5. Prepare management reports.

III. COST HIERARCHY

1. Unit-level activities are performed each time a unit is produced. The costs of unit-level activities should be proportional to the number of units produced.
2. Batch-level activities are performed each time a batch is handled or processed, regardless of how many units are in the batch. Costs at the batch level do not depend on the number of units produced, the number of units sold, or other unit-level measures of volume.
3. Product-level activities relate to specific products and typically must be carried out regardless of how many batches or units of product are produced or sold.
4. Customer-level activities relate to specific customers and include activities such as sales calls, catalog mailings, and general technical support that are not tied to any specific product.
5. Organization-sustaining activities are carried out regardless of which products are produced, how many batches are run, or how many units are made.

IV. THE CLASSIC BRASS EXAMPLE

<u>Activity Cost Pool</u>	<u>Activity Measure</u>
Customer Orders	Number of customer orders
Product Design	Number of product designs
Order Size	Machine-hours
Customer Relations	Number of active customers
Other	Not applicable



THE CLASSIC BRASS EXAMPLE (continued)

*Exhibit 7-3
Annual Overhead Costs
(both Manufacturing and Nonmanufacturing)
at Classic Brass*

Production Department:		
Indirect factory wages.....	\$500,000	
Factory equipment depreciation	300,000	
Factory utilities.....	120,000	
Factory building lease.....	<u>80,000</u>	\$1,000,000
General Administrative Department:		
Administrative wages and salaries	400,000	
Office equipment depreciation.....	50,000	
Administrative building lease	<u>60,000</u>	510,000
Marketing Department:		
Marketing wages and salaries	250,000	
Selling expenses.....	<u>50,000</u>	<u>300,000</u>
Total overhead cost.....		<u>\$1,810,000</u>

*Exhibit 7-4
Results of Interviews*

	<i>Activity Cost Pools</i>					<i>Total</i>
	<i>Customer</i>	<i>Product</i>	<i>Order</i>	<i>Customer</i>		
	<i>Orders</i>	<i>Design</i>	<i>Size</i>	<i>Relations</i>	<i>Other</i>	
Production Department:						
Indirect factory wages	25%	40%	20%	10%	5%	100%
Factory equipment depreciation	20%	0%	60%	0%	20%	100%
Factory utilities	0%	10%	50%	0%	40%	100%
Factory building lease	0%	0%	0%	0%	100%	100%
General Administrative Department:						
Administrative wages and salaries	15%	5%	10%	30%	40%	100%
Office equipment depreciation	30%	0%	0%	25%	45%	100%
Administrative building lease	0%	0%	0%	0%	100%	100%
Marketing Department:						
Marketing wages and salaries	22%	8%	0%	60%	10%	100%
Selling expenses	10%	0%	0%	70%	20%	100%

*Exhibit 7-5
First-Stage Allocations to Activity Cost Pools*

	<i>Activity Cost Pools</i>					<i>Total</i>
	<i>Customer</i>	<i>Product</i>	<i>Customer</i>			
	<i>Orders</i>	<i>Design</i>	<i>Order Size</i>	<i>Relations</i>	<i>Other</i>	
Production Department:						
Indirect factory wages						\$500,000
Factory equipment depreciation						300,000
Factory utilities	0	12,000	60,000	0	48,000	120,000
Factory building lease	0	0	0	0	80,000	80,000
General Administrative Department:						
Administrative wages and salaries	60,000	20,000	40,000	120,000	160,000	400,000
Office equipment depreciation	15,000	0	0	12,500	22,500	50,000
Administrative building lease	0	0	0	0	60,000	60,000
Marketing Department:						
Marketing wages and salaries	55,000	20,000	0	150,000	25,000	250,000
Selling expenses	<u>5,000</u>	<u>0</u>	<u>0</u>	<u>35,000</u>	<u>10,000</u>	<u>50,000</u>
Total	<u>\$320,000</u>	<u>\$252,000</u>	<u>\$380,000</u>	<u>\$367,500</u>	<u>\$490,500</u>	<u>\$1,810,000</u>

Exhibit 7-6
Computation of Activity Rates

<i>Activity Cost Pools</i>	<i>(a)</i> <i>Total Cost</i>	<i>(b)</i> <i>Total Activity</i>	<i>(a) ÷ (b)</i> <i>Activity Rate</i>
Customer orders	_____	1,000 orders	_____ per order
Product design	_____	400 designs	_____ per design
Order size	_____	20,000 MHs	_____ per MH
Customer relations	_____	250 customers	_____ per customer
Other	_____	Not applicable	Not applicable

Standard Stanchions

1. This product does not require any new design resources.
2. Thirty thousand units were ordered during the year, comprising 600 separate orders.
3. Each stanchion requires 35 minutes of machine time for a total of 17,500 machine-hours.

Custom Compass Housings

1. This is a custom product that requires new design resources.
2. There were 400 orders for custom compass housings. Orders for this product are placed separately from orders for standard stanchions.
3. There were 400 custom designs prepared. One custom design was prepared for each order.
4. Because some orders were for more than one unit, a total of 1,250 custom compass housings were produced during the year. A custom compass housing requires an average of 2 machine-hours for a total of 2,500 machine-hours.

	<i>Standard</i> <i>Stanchions</i>	<i>Custom</i> <i>Compass</i> <i>Housings</i>	<i>Total</i>
Sales	\$2,660,000	\$540,000	\$3,200,000
Direct costs:			
Direct materials	\$905,500	\$69,500	\$975,000
Direct labor	\$263,750	\$87,500	\$351,250
Shipping	\$60,000	\$5,000	\$65,000

Exhibit 7-8
Assigning Overhead Costs to Products

<i>Activity Cost Pools</i>	<i>(a)</i> <i>Activity Rate</i>	<i>(b)</i> <i>Activity</i>	<i>(a) × (b)</i> <i>ABC Cost</i>
<i>Standard Stanchions</i>			
Customer orders	_____ per order	_____ orders	\$192,000
Product design	_____ per design	_____ designs	0
Order size	_____ per MH	_____ MHs	<u>332,500</u>
Total			<u>\$524,500</u>
<i>Custom Compass Housings</i>			
Customer orders	\$320 per order	400 orders	\$128,000
Product design	\$630 per design	400 designs	252,000
Order size	\$19 per MH	2,500 MHs	<u>47,500</u>
Total			<u>\$427,500</u>

Exhibit 7-10
Product Margins—Activity-Based Costing

	<u><i>Standard Stanchions</i></u>	<u><i>Custom Compass Housings</i></u>
Sales	\$2,660,000	\$540,000
Costs:		
Direct materials.....	\$905,500	\$ 69,500
Direct labor	263,750	87,500
Shipping.....	60,000	5,000
Customer orders (from Exhibit 7-8).....	192,000	128,000
Product design (from Exhibit 7-8).....	0	252,000
Order size (from Exhibit 7-8)	<u>332,500</u>	<u>47,500</u>
Total cost.....	<u>1,753,750</u>	<u>589,500</u>
Product margin.....	<u>\$ 906,250</u>	<u>\$(49,500)</u>

THE CLASSIC BRASS EXAMPLE (continued)

Exhibit 7-9
Assigning Overhead Costs to Customers

Overhead Cost for Windward Yachts

<i>Activity Cost Pools</i>	<i>(a)</i> <i>Activity Rate</i>	<i>(b)</i> <i>Activity</i>	<i>(a) × (b)</i> <i>ABC Cost</i>
Customer orders	\$320 per order	3 orders	\$ 960
Product design	\$630 per design	1 designs	630
Order size.....	\$19 per MH	177 MHs	3,363
Customer relations.....	\$1,470 per customer	1 customer	<u>1,470</u>
Total			<u>\$6,423</u>

Exhibit 7-11
Customer Margin—Activity-Based Costing

Customer Margin for Windward Yachts

Sales (given)		\$11,350
Costs:		
Direct materials (given)	\$2,123	
Direct labor (given).....	1,900	
Shipping costs (given).....	205	
Customer orders (from Exhibit 7-9).....	960	
Product design (from Exhibit 7-9)	630	
Order size (from Exhibit 7-9).....	3,363	
Customer relations (from Exhibit 7-9)	<u>1,470</u>	<u>10,651</u>
Customer margin.....		<u>\$ 699</u>

Exhibit 7-12
Product Margins—Traditional Costing System

	<i>Standard Stanchions</i>	<i>Custom Compass Housing</i>	<i>Total</i>
Sales (given)	\$2,660,000	\$540,000	\$3,200,000
Cost:			
Direct materials (given)	\$905,500	\$ 69,500	\$ 975,000
Direct labor (given)	263,750	87,500	351,250
Manufacturing overhead (see below)	875,000	125,000	1,000,000
Product margin	\$ 615,750	\$258,000	873,750
Selling and administrative expense (given)			875,000
Net operating income			\$(1,250)

$$\begin{aligned}
 \text{Predetermined manufacturing overhead rate} &= \frac{\text{Total estimated manufacturing overhead}}{\text{Total estimated machine-hours}} \\
 &= \frac{\$1,000,000}{20,000 \text{ machine-hours}} = \$50 \text{ per machine-hour}
 \end{aligned}$$

The standard stanchions require 17,500 machine-hours and the custom compass housings require 2,500 machine-hours. Therefore, \$875,000 (= 17,500 machine-hours × \$50 per machine-hour) of manufacturing overhead would be charged to the standard stanchions and \$125,000 (= 2,500 machine-hours × \$50 per machine-hour) to the custom compass housing.

CONTRASTING ACTIVITY-BASED COSTING AND TRADITIONAL COSTING

Traditional Cost System	Standard Stanchions		Custom Compass Housings		(c) Total
	(a) Amount	(a) ÷ (c) %	(b) Amount	(b) ÷ (c) %	
Direct materials	\$ 905,500	92.9%	\$ 69,500	7.1%	\$ 975,000
Direct labor	263,750	75.1%	87,500	24.9%	351,250
Manufacturing overhead	875,000	87.5%	125,000	12.5%	1,000,000
Total cost assigned to products	<u>\$2,044,250</u>		<u>\$282,000</u>		2,326,250
Selling and administrative					875,000
Total cost					<u>\$3,201,250</u>
Activity-Based Costing System					
Direct costs:					
Direct materials	\$ 905,500	92.9%	\$ 69,500	7.1%	\$ 975,000
Direct labor	263,750	75.1%	87,500	24.9%	351,250
Shipping	60,000	92.3%	5,000	7.7%	65,000
Indirect costs:					
Customer orders	192,000	60.0%	128,000	40.0%	320,000
Product design	0	0.0%	252,000	100.0%	252,000
Order size	332,500	87.5%	47,500	12.5%	380,000
Total cost assigned to products	<u>\$1,753,750</u>		<u>\$589,500</u>		2,343,250
Costs not assigned to products:					
Customer relations					367,500
Other					490,500
Total cost					<u>\$3,201,250</u>

TYPICAL IMPACT ON PRODUCT COSTS FROM IMPLEMENTING ABC

- Adopting activity-based costing usually results in shifting manufacturing overhead costs from high-volume products (e.g., stanchions) to low-volume products (e.g., custom compass housings).
- The cost per unit of the low-volume products increases and the cost per unit of the high-volume products decreases because of better assignment of batch-level and product-level costs.
- The effects are not symmetrical—the dollar effect on the cost per unit of the low-volume products is usually larger.

Note: The product costs from the activity-based costing system described here would not be acceptable for external financial reports.

- Excludes some manufacturing costs (i.e., costs of idle capacity and organization-sustaining costs)
- Includes some nonmanufacturing costs.
- Relies on subjective interview data.

a company’s traditional cost accounting system. While the ABC system is almost certainly more accurate, managers should nevertheless exercise caution before making decisions based on the ABC data. Some of the costs may not be avoidable and hence would not be relevant.

Review Problem: Activity-Based Costing

Ferris Corporation makes a single product—a fire-resistant commercial filing cabinet—that it sells to office furniture distributors. The company has a simple ABC system that it uses for internal decision making. The company has two overhead departments whose costs are listed on the following page:

Manufacturing overhead	\$500,000
Selling and administrative overhead	300,000
Total overhead costs	<u>\$800,000</u>

The company’s ABC system has the following activity cost pools and activity measures:

Activity Cost Pool	Activity Measure
Assembling units	Number of units
Processing orders	Number of orders
Supporting customers	Number of customers
Other	Not applicable

Costs assigned to the “Other” activity cost pool have no activity measure; they consist of the costs of unused capacity and organization-sustaining costs—neither of which are assigned to orders, customers, or the product.

Ferris Corporation distributes the costs of manufacturing overhead and of selling and administrative overhead to the activity cost pools based on employee interviews, the results of which are reported below:

Distribution of Resource Consumption Across Activity Cost Pools					
	Assembling Units	Processing Orders	Supporting Customers	Other	Total
Manufacturing overhead	50%	35%	5%	10%	100%
Selling and administrative overhead	10%	45%	25%	20%	100%
Total activity	1,000 units	250 orders	100 customers		

Required:

1. Perform the first-stage allocation of overhead costs to the activity cost pools as in Exhibit 7–5.
2. Compute activity rates for the activity cost pools as in Exhibit 7–6.
3. OfficeMart is one of Ferris Corporation’s customers. Last year, OfficeMart ordered filing cabinets four different times. OfficeMart ordered a total of 80 filing cabinets during the year. Construct a table as in Exhibit 7–9 showing the overhead costs attributable to OfficeMart.
4. The selling price of a filing cabinet is \$595. The cost of direct materials is \$180 per filing cabinet, and direct labor is \$50 per filing cabinet. What is the customer margin of OfficeMart? See Exhibit 7–11 for an example of how to complete this report.

PROBLEM 7–21 Activity-Based Costing and Bidding on Jobs [L02, L03, L04]

Mercer Asbestos Removal Company removes potentially toxic asbestos insulation and related products from buildings. There has been a long-simmering dispute between the company’s estimator and the work supervisors. The on-site supervisors claim that the estimators do not adequately distinguish between



routine work such as removal of asbestos insulation around heating pipes in older homes and nonroutine work such as removing asbestos-contaminated ceiling plaster in industrial buildings. The on-site supervisors believe that nonroutine work is far more expensive than routine work and should bear higher customer charges. The estimator sums up his position in this way: “My job is to measure the area to be cleared of asbestos. As directed by top management, I simply multiply the square footage by \$2.50 to determine the bid price. Because our average cost is only \$2.175 per square foot, that leaves enough cushion to take care of the additional costs of nonroutine work that shows up. Besides, it is difficult to know what is routine or not routine until you actually start tearing things apart.”

To shed light on this controversy, the company initiated an activity-based costing study of all of its costs. Data from the activity-based costing system follow:

Activity Cost Pool	Activity Measure	Total Activity
Removing asbestos	Thousands of square feet	800 thousand square feet
Estimating and job setup	Number of jobs	500 jobs
Working on nonroutine jobs	Number of nonroutine jobs	100 nonroutine jobs
Other (costs of idle capacity and organization-sustaining costs)	None	

Note: The 100 nonroutine jobs are included in the total of 500 jobs. Both nonroutine jobs and routine jobs require estimating and setup.

Costs for the Year

Wages and salaries	\$ 300,000
Disposal fees	700,000
Equipment depreciation	90,000
On-site supplies	50,000
Office expenses	200,000
Licensing and insurance	400,000
Total cost	<u>\$1,740,000</u>

Distribution of Resource Consumption Across Activities

	Removing Asbestos	Estimating and Job Setup	Working on Nonroutine Jobs	Other	Total
Wages and salaries	50%	10%	30%	10%	100%
Disposal fees	60%	0%	40%	0%	100%
Equipment depreciation	40%	5%	20%	35%	100%
On-site supplies	60%	30%	10%	0%	100%
Office expenses	10%	35%	25%	30%	100%
Licensing and insurance	30%	0%	50%	20%	100%

Required:

- Using Exhibit 7–5 as a guide, perform the first-stage allocation of costs to the activity cost pools.
- Using Exhibit 7–6 as a guide, compute the activity rates for the activity cost pools.
- Using the activity rates you have computed, determine the total cost and the average cost per thousand square feet of each of the following jobs according to the activity-based costing system.
 - A routine 1,000-square-foot asbestos removal job.
 - A routine 2,000-square-foot asbestos removal job.
 - A nonroutine 2,000-square-foot asbestos removal job.
- Given the results you obtained in (3) above, do you agree with the estimator that the company’s present policy for bidding on jobs is adequate?