

Chapter 8

Activity-Based Costing: A Tool to Aid Decision Making

Solutions to Questions

8-1 Activity-based costing differs from traditional costing systems in a number of ways. In activity-based costing, nonmanufacturing as well as manufacturing costs may be assigned to products. And, some manufacturing costs—including the costs of idle capacity—may be excluded from product costs. An activity-based costing system typically includes a number of activity cost pools, each of which has its unique measure of activity. These measures of activity often differ from the allocation bases used in traditional costing systems.

8-2 When direct labor is used as an allocation base for overhead, it is implicitly assumed that overhead cost is directly proportional to direct labor. When cost systems were originally developed in the 1800s, this assumption may have been reasonably accurate. However, direct labor has declined in importance over the years while overhead has been increasing. This suggests that there is no longer a direct link between the level of direct labor and overhead. Indeed, when a company automates, direct labor is replaced by machines; a decrease in direct labor is accompanied by an increase in overhead. This violates the assumption that overhead cost is directly proportional to direct labor. Overhead cost appears to be driven by factors such as product diversity and complexity as well as by volume, for which direct labor has served as a convenient measure.

8-3 Top managers provide leadership that is needed to properly motivate all employees to

embrace the need to implement ABC. Top managers also have the authority to link ABC data to the employee evaluation and reward system. Cross-functional employees are also important because they possess intimate knowledge of operations that is needed to design an effective ABC system. Tapping the knowledge of cross-functional employees also lessens their resistance to ABC because they feel included in the implementation process.

8-4 Unit-level activities are performed for each unit that is produced. Batch-level activities are performed for each batch regardless of how many units are in the batch. Product-level activities must be carried out to support a product regardless of how many batches are run or units produced. Customer-level activities must be carried out to support customers regardless of what products or services they buy. Organization-sustaining activities are carried out regardless of the company's precise product mix or mix of customers.

8-5 Organization-sustaining costs, customer-level costs, and the costs of idle capacity should not be assigned to products. These costs represent resources that are not consumed by the products.

8-6 In activity-based costing, costs must first be allocated to activity cost pools and then they are allocated from the activity cost pools to products, customers, and other cost objects.

8-7 Because people are often involved in more than one activity, some way must be found to estimate how much time they spend in each activity. The most practical approach is often to ask employees how they spend their time. It is also possible to ask people to keep records of how they spend their time or observe them as they perform their tasks, but both of these alternatives are costly and it is not obvious that the data would be any better. People who know they are being observed may change how they behave.

8-8 In traditional cost systems, product-level costs are indiscriminately spread across all products using direct labor-hours or some other allocation base related to volume. As a consequence, high-volume products are assigned the bulk of such costs. If a product is responsible for 40% of the direct labor in a factory, it will be assigned 40% of the manufacturing overhead cost in the factory—including 40% of the product-level costs of low-volume products. In an activity-based costing system, batch-level and product-level costs are assigned more appropriately. This results in shifting product-level costs back to the

products that cause them and away from the high-volume products. (A similar effect will be observed with batch-level costs if high-volume products are produced in larger batches than low-volume products.)

8-9 Activity rates tell managers the average cost of resources consumed to carry out a particular activity such as processing purchase orders. An activity whose average cost is high may be a good candidate for process improvements. Benchmarking can be used to identify which activities have unusually large costs. If some other organization is able to carry out the activity at a significantly lower cost, it is reasonable to suppose that improvement may be possible.

8-10 The activity-based costing approach described in the chapter is probably unacceptable for external financial reports for two reasons. First, activity-based product costs, as described in this chapter, exclude some manufacturing costs and include some nonmanufacturing costs. Second, the first-stage allocations are based on interviews rather than verifiable, objective data.

Exercise 8-1 (10 minutes)

a.	Receive raw materials from suppliers.	Batch-level
b.	Manage parts inventories.	Product-level
c.	Do rough milling work on products.	Unit-level
d.	Interview and process new employees in the personnel department.	Organization-sustaining
e.	Design new products.	Product-level
f.	Perform periodic preventive maintenance on general-use equipment.	Organization-sustaining
g.	Use the general factory building.	Organization-sustaining
h.	Issue purchase orders for a job.	Batch-level

Some of these classifications are debatable and depend on the specific circumstances found in particular companies.

Exercise 8-2 (15 minutes)

	<i>Travel</i>	<i>Pickup and Delivery</i>	<i>Cus- tomer Service</i>	<i>Other</i>	<i>Totals</i>
Driver and guard wages.....	\$360,00	\$252,00			
	0	0	\$ 72,000	\$ 36,000	\$ 720,000
Vehicle operating expense.....	196,000	14,000	0	70,000	280,000
Vehicle depreciation.....	72,000	18,000	0	30,000	120,000
Customer representative salaries and expenses.....	0	0	144,000	16,000	160,000
Office expenses.....	0	6,000	9,000	15,000	30,000
Administrative expenses.....	0	16,000	192,000	112,000	320,000
Total cost.....	<u>\$628,00</u>	<u>\$306,00</u>	<u>\$417,00</u>	<u>\$279,00</u>	<u>\$1,630,00</u>
	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

Each entry in the table is derived by multiplying the total cost for the cost category by the percentage taken from the table below that shows the distribution of resource consumption:

	<i>Travel</i>	<i>Pickup and Delivery</i>	<i>Cus- tomer Service</i>	<i>Other</i>	<i>Totals</i>
Driver and guard wages.....	50%	35%	10%	5%	100%
Vehicle operating expense.....	70%	5%	0%	25%	100%
Vehicle depreciation.....	60%	15%	0%	25%	100%
Customer representative salaries and expenses.....	0%	0%	90%	10%	100%
Office expenses.....	0%	20%	30%	50%	100%
Administrative expenses.....	0%	5%	60%	35%	100%

Exercise 8-3 (10 minutes)

<i>Activity Cost Pool</i>	<i>Estimated Overhead Cost</i>	<i>Expected Activity</i>	<i>Activity Rate</i>
		150,000	\$0.48
Caring for lawn.....	\$72,000	0 square feet of lawn	per square foot of lawn
Caring for garden beds— low maintenance.....	\$26,400	20,000 square feet of low maintenance beds	\$1.32 per square foot of low maintenance beds
Caring for garden beds—high maintenance.....	\$41,400	15,000 square feet of high maintenance beds	\$2.76 per square foot of high maintenance beds
Travel to jobs.....	\$3,250	12,500 miles	\$0.26 per mile
Customer billing and service.	\$8,750	25 customers	\$350 per customer

The activity rate for each activity cost pool is computed by dividing its estimated overhead cost by its expected activity.

Exercise 8-4 (10 minutes)*K425*

<i>Activity Cost Pool</i>		<i>Activity Rate</i>		<i>Activity</i>	<i>ABC Cost</i>
Supporting direct labor.....	\$6	per direct labor-hour	80	direct labor-hours	\$ 480
Machine processing.....	\$4	per machine-hour	100	machine-hours	400
Machine setups.....	\$50	per setup	1	setups	50
Production orders.....	\$90	per order	1	order	90
Shipments.....	\$14	per shipment	1	shipment	14
Product sustaining.....	\$84	per product	1	product	<u>840</u>
	0				
Total.....					<u>\$1,874</u>

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<i>Activity Cost Pool</i>		<i>Activity Rate</i>		<i>Activity</i>	<i>ABC Cost</i>
Supporting direct labor.....	\$6	per direct labor-hour	500	direct labor-hours	\$ 3,000
Machine processing.....	\$4	per machine-hour	1,500	machine-hours	6,000
			0		
Machine setups.....	\$50	per setup	4	setups	200
Production orders.....	\$90	per order	4	orders	360
Shipments.....	\$14	per shipment	10	shipments	140
Product sustaining.....	\$84	per product	1	product	<u>840</u>
	0				
Total.....					<u>\$10,540</u>

Exercise 8-5 (15 minutes)

Sales (\$1,850 per standard model glider × 20 standard model gliders + \$2,400 per custom designed glider × 3 custom designed gliders).....		\$44,200
Costs:		
Direct materials (\$564 per standard model glider × 20 standard model gliders + \$634 per custom designed glider × 3 custom designed gliders).....	\$13,182	
Direct labor (\$19.50 per direct labor-hour × 26.35 direct labor-hours per standard model glider × 20 standard model gliders + \$19.50 per direct labor-hour × 28 direct labor-hours per custom designed glider × 3 custom designed gliders).....	11,915	
Supporting direct labor (\$26 per direct labor-hour × 26.35 direct labor-hours per standard model glider × 20 standard model gliders + \$26 per direct labor-hour × 28 direct labor-hours per custom designed glider × 3 custom designed gliders).....	15,886	
Order processing (\$284 per order × 4 orders).....	1,136	
Custom designing (\$186 per custom design × 3 custom designs).....	558	
Customer service (\$379 per customer × 1 customer).....	<u>379</u>	<u>43,056</u>
Customer margin.....		<u>\$ 1,144</u>

Exercise 8-6 (10 minutes)

	<i>Activity</i>	<i>Activity Classification</i>	<i>Examples of Activity Measures</i>
a.	Direct labor workers assemble a product.	Unit	Direct labor-hours
b.	Products are designed by engineers.	Product	Number of new products designed; hours of design time
c.	Equipment is set up.	Batch	Number of setups; setup hours
d.	Machines are used to shape and cut materials.	Unit	Number of units processed; machine-hours
e.	Monthly bills are sent out to regular customers.	Customer	Number of bills sent; time spent preparing bills
f.	Materials are moved from the receiving dock to production lines.	Batch	Number of loads transferred; time spent moving materials
g.	All completed units are inspected for defects.	Unit	Number of units inspected; Inspection hours

Notes:

1. In all cases except for direct labor in part (a), two activity measures are listed. The first is a “transaction driver” and the second is a “duration driver.” Transaction drivers are simple counts of the number of times an activity occurs such as the number of times materials are moved. Duration drivers are measures of the amount of time required to perform an activity such as the time spent moving materials. In general, duration drivers are more accurate measures of the consumption of resources than transaction drivers, but they take more effort to record.

Exercise 8-7 (30 minutes)

1. Activity rates are computed as follows:

<i>Activity Cost Pool</i>	(a) <i>Estimated Overhead Cost</i>	(b) <i>Expected Activity</i>	(a) ÷ (b) <i>Activity Rate</i>
Machine setups.....	\$72,000	400 setups	\$180 per setup
Special processing.	\$200,000	5,000 MHs	\$40 per MH
General factory.....	\$816,000	24,000 DLHs	\$34 per DLH

2. Overhead is assigned to the two products as follows:

Hubs:

<i>Activity Cost Pool</i>	(a) <i>Activity Rate</i>	(b) <i>Activity</i>	(a) × (b) <i>ABC Cost</i>
Machine setups.....	\$180 per setup	100 setups	\$ 18,000
Special processing.....	\$40 per MH	5,000 MHs	200,000
General factory.....	\$34 per DLH	8,000 DLHs	<u>272,000</u>
Total.....			<u>\$490,000</u>

Sprockets:

<i>Activity Cost Pool</i>	(a) <i>Activity Rate</i>	(b) <i>Activity</i>	(a) × (b) <i>ABC Cost</i>
Machine setups.....	\$180 per setup	300 setups	\$ 54,000
Special processing.....	\$40 per MH	0 MHs	0
General factory.....	\$34 per DLH	16,000 DLHs	<u>544,000</u>
Total.....			<u>\$598,000</u>

Exercise 8-7 (continued)

	<i>Hubs</i>	<i>Sprockets</i>
Direct materials.....	\$32.00	\$18.00
Direct labor:		
\$15 per DLH × 0.80 DLHs per unit.....	12.00	
\$15 per DLH × 0.40 DLHs per unit.....		6.00
Overhead:		
\$490,000 ÷ 10,000 units.....	<u>49.00</u>	
\$598,000 ÷ 40,000 units.....		<u>14.95</u>
Unit cost.....	<u>\$93.00</u>	<u>\$38.95</u>

Exercise 8-8 (10 minutes)

<i>Activity Cost Pool</i>	<i>(a) Activity Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) ABC Cost</i>
Order size.....	R16.85 per direct labor-hour	200 direct labor-hours	R3,370
Customer orders	R320.00 per customer order	1 customer order	320
Product testing...	R89.00 per product testing hour	4 product testing hours	356
Selling.....	R1,090.00 per sales call	2 sales calls	<u>2,180</u>
Total.....			<u><u>R6,226</u></u>

According to these calculations, the total overhead cost of the order was R 6,226.

Exercise 8-9 (10 minutes)

Teller wages.....	\$160,000
Assistant branch manager salary.	\$75,000
Branch manager salary.....	\$80,000

Distribution of Resource Consumption Across Activities

	<i>Opening Accounts</i>	<i>Processing Deposits and Withdrawals</i>	<i>Processing Other Customer Transactions</i>	<i>Other Activities</i>	<i>Totals</i>
Teller wages.....	5%	65%	20%	10%	100%
Assistant branch manager salary..	15%	5%	30%	50%	100%
Branch manager salary.....	5%	0%	10%	85%	100%

	<i>Opening Accounts</i>	<i>Processing Deposits and Withdrawals</i>	<i>Processing Other Customer Transactions</i>	<i>Other Activities</i>	<i>Totals</i>
Teller wages.....	\$ 8,000	\$104,000	\$32,000	\$ 16,000	\$160,000
Assistant branch manager salary..	11,250	3,750	22,500	37,500	75,000
Branch manager salary.....	4,000	0	8,000	68,000	80,000
Total cost.....	<u>\$23,250</u>	<u>\$107,750</u>	<u>\$62,500</u>	<u>\$121,500</u>	<u>\$315,000</u>

Teller wages are \$160,000 and 65% of the tellers' time is spent processing deposits and withdrawals:
 $\$160,000 \times 65\% = \$104,000$.

Other entries in the table are determined similarly.

Exercise 8-10 (20 minutes)

1. Computation of activity rates:

<i>Activity Cost Pools</i>	<i>(a) Total Cost</i>	<i>(b) Total Activity</i>	<i>(a) ÷ (b) Activity Rate</i>
Opening accounts.....	\$23,250	500 accounts opened	\$46.50 per account opened
Processing deposits and withdrawals...	\$107,750	100,000 deposits and withdrawals	\$1.08 per deposit or withdrawal
Processing other customer transactions	\$62,500	5,000 other customer transactions	\$12.50 per other customer transaction

2. The cost of opening an account at the Westfield branch is much higher than at the lowest cost branch (\$46.50 versus \$26.75). On the other hand, the cost of processing deposits and withdrawals is lower than at the lowest cost branch (\$1.08 versus \$1.24). And the cost of processing other customer transactions is higher at the Westfield branch (\$12.50 versus \$11.86). The other branches may have something to learn from Westfield concerning processing deposits and withdrawals and Westfield may benefit from learning about how some of the other branches open accounts and process other transactions. It may be particularly instructive to compare the details of the activity rates. For example, is the cost of opening accounts at Westfield high because of the involvement of the assistant branch manager in this activity? Perhaps tellers open new accounts at other branches.

The apparent differences in the costs of the activities at the various branches could be due to inaccuracies in employees' reports of the amount of time they devote to the activities. The differences in costs may also reflect different strategies. For example, the Westfield branch may purposely spend more time with new customers in order to win their loyalty. The higher cost of opening new accounts at the Westfield branch may be justified by future benefits of having more satisfied customers.

Nevertheless, comparative studies of the costs of activities may provide a useful starting point for

identifying best practices within a company and where improvements can be made.

Exercise 8-11 (10 minutes)

	<i>Activity</i>	<i>Activity Level</i>
a.	Sales representatives' periodic visits to customers to keep them informed about the services provided by CD Express.	Customer-level
b.	Ordering labels from the printer for a particular CD*.	Product-level
c.	Setting up the CD duplicating machine to make copies from a particular master CD.	Batch-level
d.	Loading the automatic labeling machine with labels for a particular CD*.	Batch-level
e.	Visually inspecting CDs and placing them by hand into protective plastic cases prior to shipping.	Unit-level
f.	Preparation of the shipping documents for the order.	Product-level
g.	Periodic maintenance of equipment.	Organization-sustaining
h.	Lighting and heating the company's production facility.	Organization-sustaining
i.	Preparation of quarterly financial reports.	Organization-sustaining

*The cost of the labels themselves would be part of direct materials.

Exercise 8-12 (15 minutes)*Customer Margin—ABC Analysis*

Sales (1,000 seats × \$20 per unit).....		\$20,000.00
Costs:		
Direct materials (\$8.50 per unit × 1,000 units) . .	\$8,500.00	
Direct labor (\$6.00 per unit × 1,000 units).....	6,000.00	
Supporting direct labor (\$5.55 per DLH × 0.25		
DLH per unit × 1,000 units).....	1,387.50	
Batch processing (\$107 per batch × 2 batches)	214.00	
Order processing (\$275 per order × 1 order).....	275.00	
Customer service overhead (\$2,463 per cus-		
tomer × 1 customer).....	<u>2,463.00</u>	<u>18,839.50</u>
Customer margin.....		<u>\$ 1,160.50</u>

Exercise 8-13 (30 minutes)

1. Under the traditional direct labor-hour based costing system, manufacturing overhead is applied to products using the predetermined overhead rate computed as follows:

$$\begin{aligned}\text{Predetermined overhead rate} &= \frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated total direct labor - hours}} \\ &= \frac{\$1,995,000}{125,000 \text{ DLHs}^*} = \$15.96 \text{ per DLH}\end{aligned}$$

*50,000 units of Model X100 @ 2.0 DLH per unit + 5,000 units of Model X200 @ 5.0 DLH per unit = 100,000 DLHs + 25,000 DLHs = 125,000 DLHs

Consequently, the product margins using the traditional approach would be computed as follows:

	<i>Model X100</i>	<i>Model X200</i>	<i>Total</i>
Sales.....	<u>\$6,000,000</u>	<u>\$2,500,000</u>	<u>\$8,500,000</u>
Direct materials.....	2,500,000	1,100,000	3,600,000
Direct labor.....	2,000,000	500,000	2,500,000
Manufacturing overhead applied @ \$15.96 per direct labor-hour.....	<u>1,596,000</u>	<u>399,000</u>	<u>1,995,000</u>
Total manufacturing cost....	<u>6,096,000</u>	<u>1,999,000</u>	<u>8,095,000</u>
Product margin.....	<u>\$ (96,000)</u>	<u>\$ 501,000</u>	<u>\$ 405,000</u>

Note that all of the manufacturing overhead cost is applied to the products under the company's traditional costing system.

Exercise 8-13 (continued)

2. Under the activity-based costing system, the product margins would be computed as follows:

	<i>Model X100</i>	<i>Model X200</i>	<i>Total</i>
Sales.....	<u>\$6,000,00</u>	<u>\$2,500,00</u>	<u>\$8,500,000</u>
	<u>0</u>	<u>0</u>	
Direct materials.....	2,500,000	1,100,000	3,600,000
Direct labor.....	2,000,000	500,000	2,500,000
Manufacturing overhead ap- plied.....	1,000,000	600,000	1,600,000
Nonmanufacturing overhead applied.....	<u>150,000</u>	<u>350,000</u>	<u>500,000</u>
Total costs.....	<u>5,650,000</u>	<u>2,550,000</u>	<u>8,200,000</u>
Product margin.....	<u>\$ 350,000</u>	<u>\$ (50,000)</u>	<u>\$ 300,000</u>

3. Under activity-based costing, a total of \$1,150,000 of manufacturing and nonmanufacturing overhead is assigned to Model X100 and a total of \$950,000 is assigned to Model X200. This is in contrast to \$1,596,000 of manufacturing overhead being assigned to Model X100 and \$399,000 being assigned to Model X200 under the traditional costing method. Also note that the total amount of overhead applied to both products is \$2,100,000 under activity-based costing and \$1,995,000 under the traditional costing method. A number of reasons exist for these differences. First, not all manufacturing overhead costs are assigned to products under activity-based costing. Apparently \$395,000 (= \$1,995,000 – \$1,600,000) of manufacturing overhead consists of the costs of idle capacity and organization-sustaining costs that are not assigned to products under activity-based costing. Counterbalancing this, a total of \$500,000 in nonmanufacturing costs are assigned to products under activity-based costing, but not under the traditional method. Additionally, manufacturing overhead costs have been shifted from Model X100, the high-volume product, to Model X200, the low-volume product under activity-based costing. This is probably due to the existence of batch-level or product-level costs that are more appropriately assigned under activity-based costing.

Exercise 8-14 (30 minutes)

1. First-stage allocations of overhead costs to the activity cost pools:

<i>Distribution of Resource Consumption Across Activity Cost Pools</i>					
	<i>Supporting Direct Labor</i>	<i>Order Pro- cessing</i>	<i>Customer Support</i>	<i>Other</i>	<i>Totals</i>
Wages and salaries.....	40%	30%	20%	10%	100%
Other overhead costs....	30%	10%	20%	40%	100%

	<i>Direct Labor Support</i>	<i>Order Pro- cessing</i>	<i>Customer Support</i>	<i>Other</i>	<i>Totals</i>
Wages and salaries.....	\$120,000	\$ 90,000	\$ 60,000	\$ 30,000	\$300,000
Other overhead costs....	30,000	10,000	20,000	40,000	100,000
Total cost.....	<u>\$150,000</u>	<u>\$100,000</u>	<u>\$ 80,000</u>	<u>\$ 70,000</u>	<u>\$400,000</u>

Example: 40% of \$300,000 is \$120,000.

2. Computation of activity rates:

<i>Activity Cost Pools</i>	<i>(a) Total Cost</i>	<i>(b) Total Activity</i>	<i>(a) ÷ (b) Activity Rate</i>
Supporting direct labor.....	\$150,000	20,000 DLHs	\$7.50 per DLH
Order processing.....	\$100,000	400 orders	\$250 per order
Customer support.....	\$80,000	200 customers	\$400 per customer

Exercise 8-14 (continued)

3. Computation of the overhead costs for the Shenzhen Enterprises order:

<i>Activity Cost Pool</i>	<i>(a) Activity Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) ABC Cost</i>
Supporting direct labor.....	\$7.50 per DLH	20 DLHs*	\$150
Order processing..	\$250 per order	1 order	250
Customer support	\$400 per customer	1 customer	<u>400</u>
Total.....			<u>\$800</u>

*2 DLHs per unit × 10 units = 20 DLHs.

4. The customer margin for Shenzhen Enterprises is computed as follows:

Customer Margin—ABC Analysis

Sales (10 units × \$300 per unit).....		\$3,000
Costs:		
Direct materials (\$180 per unit × 10 units).....	\$1,800	
Direct labor (\$50 per unit × 10 units).....	500	
Support direct labor overhead (see part 3 above).....	150	
Order processing overhead (see part 3 above).....	250	
Customer support overhead (see part 3 above).....	<u>400</u>	<u>3,100</u>
Customer margin.....		<u>\$ (100)</u>

Exercise 8-15 (30 minutes)

1. The first step is to determine the activity rates:

<i>Activity Cost Pools</i>	(a) <i>Total Cost</i>	(b) <i>Total Activity</i>	(a) ÷ (b) <i>Activity Rate</i>
Serving parties.....	\$33,000	6,000 parties	\$5.50 per party
Serving diners.....	\$138,000	15,000 diners	\$9.20 per diner
Serving drinks.....	\$24,000	10,000 drinks	\$2.40 per drink

According to the activity-based costing system, the cost of serving each of the parties can be computed as follows:

a. Party of 4 persons who order a total of 3 drinks:

<i>Activity Cost Pool</i>	(a) <i>Activity Rate</i>	(b) <i>Activity</i>	(a) × (b) <i>ABC Cost</i>
Serving parties.....	\$5.50 per party	1 party	\$ 5.50
Serving diners.....	\$9.20 per diner	4 diners	36.80
Serving drinks.....	\$2.40 per drink	3 drinks	<u>7.20</u>
Total.....			<u>\$49.50</u>

b. Party of 2 persons who order no drinks:

<i>Activity Cost Pool</i>	(a) <i>Activity Rate</i>	(b) <i>Activity</i>	(a) × (b) <i>ABC Cost</i>
Serving parties.....	\$5.50 per party	1 party	\$ 5.50
Serving diners.....	\$9.20 per diner	2 diners	18.40
Serving drinks.....	\$2.40 per drink	0 drinks	<u>0</u>
Total.....			<u>\$23.90</u>

c. Party of 1 person who orders 2 drinks:

<i>Activity Cost Pool</i>	(a) <i>Activity Rate</i>	(b) <i>Activity</i>	(a) × (b) <i>ABC Cost</i>
Serving parties.....	\$5.50 per party	1 party	\$ 5.50
Serving diners.....	\$9.20 per diner	1 diner	9.20
Serving drinks.....	\$2.40 per drink	2 drinks	<u>4.80</u>
Total.....			<u>\$19.50</u>

Exercise 8-15 (continued)

2. The average cost per diner for each party can be computed by dividing the total cost of the party by the number of diners in the party as follows:
 - a. $\$49.50 \div 4 \text{ diners} = \12.375 per diner
 - b. $\$23.90 \div 2 \text{ diners} = \11.95 per diner
 - c. $\$19.50 \div 1 \text{ diner} = \19.50 per diner
3. The average cost per diner differs from party to party under the activity-based costing system for two reasons. First, the cost of serving a party (\$5.50) does not depend on the number of diners in the party. Therefore, the average cost per diner of this activity decreases as the number of diners in the party increases. With only one diner, the cost is \$5.50. With two diners, the average cost per diner is cut in half to \$2.75. With five diners, the average cost per diner would be only \$1.10, and so on. Second, the average cost per diner differs also because of the differences in the number of drinks ordered by the diners. If a party does not order any drinks, as was the case with the party of two, no costs of serving drinks are assigned to the party.

The average cost per diner differs from the overall average cost of \$16 per diner for several reasons. First, the average cost of \$16 per diner includes organization-sustaining costs that are excluded from the computations in the activity-based costing system. Second, the \$16 per diner figure does not recognize differences in the diners' demands on resources. It does not recognize that some diners order more drinks than others nor does it recognize the economies of scale in serving larger parties. (The batch-level costs of serving a party can be spread over more diners if the party is larger.)

We should note that the activity-based costing system itself does not recognize all of the differences in diners' demands on resources. For example, there are undoubtedly differences in the costs of preparing the various meals on the menu. It may or may not be worth the effort to build a more detailed activity-based costing system that would take such nuances into account.

Problem 8-16 (45 minutes)

1. Under the traditional direct labor-hour based costing system, manufacturing overhead is applied to products using the predetermined overhead rate computed as follows:

$$\begin{aligned}\text{Predetermined overhead rate} &= \frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated total direct labor - hours}} \\ &= \frac{\$1,980,000}{120,000 \text{ DLHs}^*} = \$16.50 \text{ per DLH}\end{aligned}$$

*20,000 units of Xtreme @ 2.00 DLH per unit + 80,000 units of the Pathfinder @ 1.0 DLH per unit = 40,000 DLHs + 80,000 DLHs = 120,000 DLHs.

Consequently, the product margins using the traditional approach would be computed as follows:

	<i>Xtreme</i>	<i>Pathfinder</i>	<i>Total</i>
Sales.....	<u>\$2,800,00</u>	<u>\$7,920,000</u>	<u>\$10,720,00</u>
	<u>0</u>		<u>0</u>
Direct materials.....	1,440,000	4,240,000	5,680,000
Direct labor.....	480,000	960,000	1,440,000
Manufacturing overhead applied @ \$16.50 per direct labor-hour.....	<u>660,000</u>	<u>1,320,000</u>	<u>1,980,000</u>
Total manufacturing cost.....	<u>2,580,000</u>	<u>6,520,000</u>	<u>9,100,000</u>
Product margin.....	<u>\$ 220,000</u>	<u>\$1,400,000</u>	<u>\$ 1,620,000</u>

Note that all of the manufacturing overhead cost is applied to the products under the company's traditional costing system.

Problem **8-16** (continued)

2. The first step is to determine the activity rates:

<i>Activity Cost Pools</i>	(a) <i>Total Cost</i>	(b) <i>Total Activity</i>	(a) ÷ (b) <i>Activity Rate</i>
Supporting direct labor.....	\$783,600	120,000 DLH	\$6.53 per DLH
Batch setups.....	\$495,000	300 setups	\$1,650 per setup
Product sustaining..	\$602,400	2 products	\$301,200 per product

*The Other activity cost pool is not shown above because it includes organization-sustaining and idle capacity costs that should not be assigned to products.

Under the activity-based costing system, the product margins would be computed as follows:

	<i>Xtreme</i>	<i>Pathfinder</i>	<i>Total</i>
Sales.....	<u>\$2,800,000</u>	<u>\$7,920,000</u>	<u>\$10,720,000</u>
			<u>0</u>
Direct materials.....	1,440,000	4,240,000	5,680,000
Direct labor.....	480,000	960,000	1,440,000
Supporting direct labor.....	261,200	522,400	783,600
Batch setups.....	330,000	165,000	495,000
Product sustaining.....	<u>301,200</u>	<u>301,200</u>	<u>602,400</u>
Total cost.....	<u>2,812,400</u>	<u>6,188,600</u>	<u>9,001,000</u>
Product margin.....	<u>\$ (12,400)</u>	<u>\$1,731,400</u>	<u>\$ 1,719,000</u>

Problem 8-16 (continued)

3. The quantitative comparison is as follows:

	Xtreme		Pathfinder		Total
<i>Traditional Cost System</i>	(a)	(a) ÷ (c)	(b)	(b) ÷ (c)	(c)
	Amount	%	Amount	%	Amount
Direct materials.....	\$1,440,000	25.4%	\$4,240,000	74.6%	\$5,680,000
	0				0
Direct labor.....	480,000	33.3%	960,000	66.7%	1,440,000
Manufacturing overhead.....	<u>660,000</u>	33.3%	<u>1,320,000</u>	66.7%	<u>1,980,000</u>
Total cost assigned to products.	<u>\$2,580,000</u>		<u>\$6,520,000</u>		<u>\$9,100,000</u>
	0				0
<i>Activity-Based Costing System</i>					
Direct costs:					
Direct materials.....	\$1,440,000	25.4%	\$4,240,000	74.6%	\$5,680,000
	0				0
Direct labor.....	480,000	33.3%	960,000	66.7%	1,440,000
Indirect costs:					
Supporting direct labor.....	261,200	33.3%	522,400	66.7%	783,600
Batch setups.....	330,000	66.7%	165,000	33.3%	495,000
Product sustaining.....	<u>301,200</u>	50.0%	<u>301,200</u>	50.0%	<u>602,400</u>
Total cost assigned to products.	<u>\$2,812,400</u>		<u>\$6,188,600</u>		9,001,000
	0				
Costs not assigned to products:					
Other.....					<u>99,000</u>
Total cost.....					<u>\$9,100,000</u>
					0

Problem 8-16 (continued)

The traditional and activity-based cost assignments differ for two reasons. First, the traditional system assigns all \$1,980,000 of manufacturing overhead to products. The ABC system assigns only \$1,881,000 of manufacturing overhead to products. The ABC system does not assign the \$99,000 of Other activity costs to products because they represent organization-sustaining and idle capacity costs. Second, the traditional system uses one unit-level activity measure, direct labor hours, to assign 33.3% of all overhead to the Xtreme product line and 66.7% of all overhead to the Pathfinder product line. The ABC system assigns 66.7% of Batch setup costs (a batch-level activity) to the Xtreme product line and 33.3% to the Pathfinder product line. The ABC system assigns 50% of Product sustaining costs (a product-level activity) to each product line.

Problem 8-17 (45 minutes)

1. The first-stage allocation of costs to activity cost pools appears below:

<i>Distribution of Resource Consumption Across Activity Cost Pools</i>					
	<i>Clean- ing Car- pets</i>	<i>Travel to Jobs</i>	<i>Job Support</i>	<i>Other</i>	<i>Total</i>
Wages.....	70%	20%	0%	10%	100%
Cleaning supplies.....	100%	0%	0%	0%	100%
Cleaning equipment depreciation.....	80%	0%	0%	20%	100%
Vehicle expenses.....	0%	60%	0%	40%	100%
Office expenses.....	0%	0%	45%	55%	100%
President's compensation.....	0%	0%	40%	60%	100%

	<i>Cleaning Carpets</i>	<i>Travel to Jobs</i>	<i>Job Support</i>	<i>Other</i>	<i>Total</i>
Wages.....	\$105,000	\$30,000	\$ 0	\$ 15,000	\$150,000
Cleaning supplies.....	40,000	0	0	0	40,000
Cleaning equipment depreciation.....	16,000	0	0	4,000	20,000
Vehicle expenses.....	0	48,000	0	32,000	80,000
Office expenses.....	0	0	27,000	33,000	60,000
President's compensation.....	0	0	32,000	48,000	80,000
Total cost.....	<u>\$161,000</u>	<u>\$78,000</u>	<u>\$59,000</u>	<u>\$132,000</u>	<u>\$430,000</u>

Example: 70% of \$150,000 = \$105,000

Other entries in the table are determined in a similar manner.

Problem 8-17 (continued)

2. The activity rates are computed as follows:

<i>Activity Cost Pool</i>	<i>(a) Total Cost</i>	<i>(b) Total Activity</i>	<i>(a) ÷ (b) Activity Rate</i>
Cleaning carpets	\$161,000	20,000 hundred square feet	\$8.05 per hundred square feet
Travel to jobs.....	\$78,000	60,000 miles	\$1.30 per mile
Job support.....	\$59,000	2,000 jobs	\$29.50 per job

3. The cost for the Flying N Ranch job is computed as follows:

<i>Activity Cost Pool</i>	<i>(a) Activity Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) ABC Cost</i>
Cleaning carpets	\$8.05 per hundred square feet	5 hundred square feet	\$ 40.25
Travel to jobs.....	\$1.30 per mile	75 miles	97.50
Job support.....	\$29.50 per job	1 job	<u>29.50</u>
Total.....			<u>\$167.25</u>

4. The margin earned on the job can be easily computed by using the costs calculated in part (3) above.

Sales.....	\$140.00	
Costs:		
Cleaning carpets...	\$40.25	
Travel to jobs.....	97.50	
Job support.....	<u>29.50</u>	<u>167.25</u>
Margin.....		<u>\$(27.25)</u>

Problem 8-17 (continued)

5. Gallatin Carpet Cleaning appears to be losing money on the Flying N Ranch job. However, caution is advised. Some of the costs may not be avoidable and hence would have been incurred even if the Flying N Ranch job had not been accepted. An action analysis (discussed in Appendix 8A) is a more appropriate starting point for analysis than the simple report in part (4) above.

Nevertheless, there is a point at which travel costs eat up all of the profit from a job. With the company's current policy of charging a flat fee for carpet cleaning irrespective of how far away the client is from the office, there clearly is some point at which jobs should be turned down. (What if a potential customer is located in Florida?)

6. The company should consider charging a fee for travel to outlying customers based on the distance traveled and a flat fee per job. At present, close-in customers are in essence subsidizing service to outlying customers and large-volume customers are subsidizing service to low-volume customers. With fees for travel and for job support, the fee per hundred square feet can be dropped substantially. This may result in losing some low-volume jobs in outlying areas, but the lower fee per hundred square feet may result in substantially more business close to Bozeman. (If the fee is low enough, the added business may not even have to come at the expense of competitors. Some customers may choose to clean their carpets more frequently if the price were more attractive.)

Problem 8-18 (20 minutes)

1. The cost of serving the local commercial market according to the ABC model can be determined as follows:

<i>Activity Cost Pool</i>	<i>(a) Activity Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) ABC Cost</i>
Animation concept.....	\$6,040 per proposal	25 proposals	\$151,000
Animation production.....	\$7,725 per minute of animation	5 minutes	38,625
Contract administration..	\$6,800 per contract	10 contracts	<u>68,000</u>
			<u>\$257,625</u>

2. The margin earned serving the local commercial market is negative, as shown below:

Profitability Analysis

Sales.....		\$180,000	
Costs:			
Animation concept.....	\$151,000		
Animation production.....	38,625		
Contract administration.....	<u>68,000</u>	<u>257,625</u>	
Margin.....		<u>\$(77,625)</u>	

3. It appears that the local commercial market is losing money and the company would be better off dropping this market segment. However, as discussed in the previous problem, not all of the costs included above may be avoidable. If more than \$77,625 of the total costs of \$257,625 is not avoidable, then the company really isn't losing money on the local commercial market and the segment should not be dropped. These issues will be discussed in more depth in Chapters 12 and 13.

Problem 8-19 (45 minutes)

1. The results of the first-stage allocation appear below:

	<i>Job Size</i>	<i>Estimating and Job Setup</i>	<i>Working on Nonroutine Jobs</i>	<i>Other</i>	<i>Totals</i>
Wages and salaries.....	\$150,000	\$ 30,000	\$ 90,000	\$ 30,000	\$ 300,000
Disposal fees.....	420,000	0	280,000	0	700,000
Equipment depreciation..	36,000	4,500	18,000	31,500	90,000
On-site supplies.....	30,000	15,000	5,000	0	50,000
Office expenses.....	20,000	70,000	50,000	60,000	200,000
Licensing and insurance.	<u>120,000</u>	<u>0</u>	<u>200,000</u>	<u>80,000</u>	<u>400,000</u>
Total cost.....	<u>\$776,000</u>	<u>\$119,500</u>	<u>\$643,000</u>	<u>\$201,500</u>	<u>\$1,740,000</u>

According to the data in the problem, 50% of the wages and salaries cost of \$300,000 is attributable to activities related to job size.

$$\$300,000 \times 50\% = \$150,000.$$

Other entries in the table are determined in a similar manner.

	<i>(a)</i> <i>Total Cost</i>	<i>(b)</i> <i>Total Activity</i>	<i>(a) ÷ (b)</i> <i>Activity Rate</i>
<i>Activity Cost Pool</i>			
Job size.....	\$776,000	800 thousand square feet	\$970 per thousand square feet
Estimating and job setup.....	\$119,500	500 jobs	\$239 per job
Working on non- routine jobs.....	\$643,000	100 nonroutine jobs	\$6,430 per nonroutine job

Problem 8-19 (continued)

3. The costs of each of the jobs can be computed as follows using the activity rates computed above:

a. *Routine one thousand square foot job:*

Job size (1 thousand square feet @ \$970 per thousand square feet).....	\$ 970.00
Estimating and job setup (1 job @ \$239 per job).....	239.00
Nonroutine job (not applicable).....	<u>0</u>
Total cost of the job.....	<u>\$1,209.00</u>
Cost per thousand square feet ($\$1,209 \div 1$ thousand square feet).....	<u>\$1,209.00</u>

b. *Routine two thousand square foot job:*

Job size (2 thousand square feet @ \$970 per thousand square feet).....	\$1,940.00
Estimating and job setup (1 job @ \$239 per job).....	239.00
Nonroutine job (not applicable).....	<u>0</u>
Total cost of the job.....	<u>\$2,179.00</u>
Cost per thousand square feet ($\$2,179 \div 2$ thousand square feet).....	<u>\$1,089.50</u>

c. *Nonroutine two thousand square foot job:*

Job size (2 thousand square feet @ \$970 per thousand square feet).....	\$1,940.00
Estimating and job setup (1 job @ \$239 per job).....	239.00
Nonroutine job.....	<u>6,430.00</u>
Total cost of the job.....	<u>\$8,609.00</u>
Cost per thousand square feet ($\$8,609 \div 2$ thousand square feet).....	<u>\$4,304.50</u>

Problem 8-19 (continued)

4. The objectivity of the interview data can be questioned because the on-site work supervisors were undoubtedly trying to prove their case about the cost of nonroutine jobs. Nevertheless, the activity-based costing data certainly suggest that dramatic differences exist in the costs of jobs. While some of the costs may be difficult to adjust in response to changes in activity, it does appear that the standard bid of \$2,500 per thousand square feet may be substantially under the company's cost for nonroutine jobs. Even though it may be difficult to detect nonroutine situations before work begins, the average additional cost of \$6,430 for nonroutine work suggests that the estimator should try. And if a nonroutine situation is spotted, this should be reflected in the bid price.

Savvy competitors are likely to bid less than \$2,500 per thousand square feet on routine work and substantially more than \$2,500 per thousand square feet on nonroutine work. Consequently, Mercer Asbestos Removal may find that its product mix shifts toward nonroutine work and away from routine work as customers accept bids on nonroutine work from the company and go to competitors for routine work. This may have a negative effect on the company's profits.

Research and Application 8-20

1. Jet Blue succeeds first and foremost because of its operational excellence customer value proposition. Pages 1-3 of the 10-K/A make numerous references to Jet Blue's goal of being a "leading low-fare, low-cost passenger airline." For example, page 2 discusses three major aspects of the company's strategy—to stimulate demand with low fares, to continuously decrease operating costs, and to offer point-to-point flights to underserved and/or overpriced markets. Page 3 describes how the company lowers its operating costs by efficiently utilizing its aircraft, maintaining a productive workforce, operating only one type of aircraft, and streamlining the reservation booking process.
2. Jet Blue faces numerous business risks as described in pages 17-23 of the 10-K/A. Students may mention other risks beyond those specifically mentioned in the 10-K/A. Here are four risks faced by Jet Blue with suggested control activities:
 - Risk: Rising fuel prices may lower profits. Control activities: Page 23 of the 10-K/A mentions that Jet Blue uses a fuel hedging program to help control this risk.
 - Risk: Jet Blue's reputation could be severely harmed by a major airplane crash. Control activities: Implement a rigorously monitored preventive maintenance program. Provide pilots with state-of-the-art flight training.
 - Risk: Page 20 of the 10-K/A mentions that approximately 75% of Jet Blue's daily flights have JFK or LaGuardia airport as their destination or point of origin. This exposes Jet Blue to the risk of a downturn in the local New York City economy or to a downturn in local tourism due to a terrorist act or some other factor. Control activities: Increase the number of cities served so that a smaller portion of total revenues is tied to New York City.
 - Risk: Jet Blue's workforce could seek to unionize. This process could result in work slowdowns or stoppages and it could increase operating expenses. Control activities: Establish a Human Resource Management Department that proactively works with employees to ensure that their morale remains high and that they feel fairly treated.

Research and Application 8-20 (continued)

3. In a manufacturing context, a unit refers to an individual unit of product. In an airline context, a “unit” refers to a passenger on a particular flight. Two examples of unit-level activities include baggage handling and ticket processing. Both activities are directly influenced by the number of passengers served. Jet Blue’s point-to-point flights simplify the baggage handling process because there is no need to transfer luggage from one flight to numerous other connecting flights. Point-to-point flights also lower the incidence of mishandled bags. Jet Blue reports that it mishandled only 2.99 bags per 1,000 customers (see page 10 of the 10-K/A).

Jet Blue uses technology to streamline ticket processing. Page 3 of the 10-K/A mentions that 75.4% of the company’s sales were booked at www.jetblue.com. This is the company’s least expensive form of ticket processing. It also mentions that Jet Blue further simplified ticket processing by enabling on-line check-ins, allowing customers to change reservations through the website, and installing 76 kiosks in 19 cities.

4. In a manufacturing context, a batch refers to a number of units of product that are processed together. A batch-level cost is the same regardless of how many units of the product are included in the batch. In an airline context, a “batch” refers to a flight departure. Examples of batch-level activities include refueling the airplane, performing pre-flight maintenance, and cleaning the interior of the cabin. The costs to refuel an airplane, maintain it, and clean it are essentially the same regardless of how many passengers are on board.

Through 2004, Jet Blue operated 70 Airbus A320 airplanes (see page 1 of the 10-K/A). Using only one type of aircraft simplifies the gate turnaround process, which includes all of the batch-level activities mentioned in the prior paragraph. Page 3 of the 10-K/A says that Jet Blue operated each airplane an average of 13.4 hours per day, which the company believes was higher than any other major U. S. airline. Efficient gate turnarounds are one of the keys to Jet Blue’s high rate of aircraft utilization.

Research and Application 8-20 (continued)

5. An example of a customer-level activity for Jet Blue is maintaining its customer loyalty program called TrueBlue Flight Gratitude (see page 4 of the 10-K/A). Currently, more than two million customers are enrolled in this program. The work involved in maintaining the customer accounts for this program is driven primarily by the number of customers served rather than the number of tickets sold. An example of an organization-sustaining activity is complying with government regulations that are established by the Department of Transportation, the Federal Aviation Administration, and the Transportation Security Administration (see page 14 of the 10-K/A). Jet Blue must comply with these regulations in order for the business to operate.

Appendix 8A

ABC Action Analysis

Exercise 8A-1(20 minutes)

Sales (100 clubs × \$50 per club).....		\$5,000.00
Green costs:		
Direct materials (100 clubs × \$29.50 per club).....	<u>\$2,950.00</u>	<u>2,950.00</u>
Green margin.....		2,050.00
Yellow costs:		
Direct labor (100 clubs × 0.3 hour per club × \$20.50 per hour).....	615.00	
Indirect labor.....	95.90	
Marketing expenses.....	<u>540.70</u>	<u>1,251.60</u>
Yellow margin.....		798.40
Red costs:		
Factory equipment depreciation.....	103.70	
Factory administration.....	259.00	
Selling and administrative wages and salaries.....	429.00	
Selling and administrative depreciation.....	<u>30.00</u>	<u>821.70</u>
Red margin.....		<u>\$ (23.30)</u>

While not required in the problem, the conventional ABC analysis would be:

Sales (100 clubs × \$50 per club).....		\$5,000.00
Costs:		
Direct materials.....	\$2,950.00	
Direct labor.....	615.00	
Supporting direct labor	285.40	
Batch processing	55.10	
Order processing	114.80	
Customer service	<u>1,003.00</u>	<u>5,023.30</u>
Customer margin.....		<u>\$ (23.30)</u>

Exercise 8A-2 (30 minutes)

1.

Activity level.....	Order Size 200 direct labor- hours	Customer Orders 1 customer order	Product Testing 4 product testing hours	Selling 2 sales calls	Total
Manufacturing overhead:					
Indirect labor.....	R1,650	R180	R120	R 0	R1,950
Factory depreciation.....	1,600	0	160	0	1,760
Factory utilities.....	20	0	4	0	24
Factory administration..	0	48	72	60	180
General selling & admin- istrative:					
Wages and salaries.....	100	80	0	1,600	1,780
Depreciation.....	0	12	0	80	92
Taxes and insurance....	0	0	0	40	40
Selling expenses.....	<u>0</u>	<u>0</u>	<u>0</u>	<u>400</u>	<u>400</u>
Total overhead cost.....	<u>R3,370</u>	<u>R320</u>	<u>R356</u>	<u>R2,180</u>	<u>R6,226</u>

Example: R8.25 per direct labor-hour from the problem statement × 200 direct labor-hours = R1,650

According to these calculations, the overhead cost of the order was R6,226.

Exercise 8A-2 (continued)

2. The table prepared in part (1) above allows two different perspectives on the overhead cost of the order. The column totals that appear in the last row of the table tell us the cost of the order in terms of the activities it required. The row totals that appear in the last column of the table tell us how much the order cost in terms of the overhead accounts in the underlying accounting system. Another way of saying this is that the column totals tell us what the costs were incurred *for*. The row totals tell us what the costs were incurred *on*. For example, you may spend money *on* a chocolate bar in order to satisfy your craving *for* chocolate. Both perspectives are important. To control costs, it is necessary to know both what the costs were incurred for and what actual costs would have to be adjusted (i.e., what the costs were incurred on).

The two different perspectives can be explicitly shown as follows:

What the overhead costs were incurred *on*:

Manufacturing overhead:

Indirect labor.....	R1,950
Factory depreciation.....	1,760
Factory utilities.....	24
Factory administration.....	180

General selling & administrative:

Wages and salaries.....	1,780
Depreciation.....	92
Taxes and insurance.....	40
Selling expenses.....	<u>400</u>

Total overhead cost.....	<u>R6,226</u>
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What the overhead costs were incurred *for*:

Order size.....	R3,370
Customer orders.....	320
Product testing.....	356
Selling.....	<u>2,180</u>
Total overhead cost.....	<u>R6,226</u>

Exercise 8A-3 (30 minutes)

	<i>Supporting Direct Labor</i> 250 Direct labor- hours*	<i>Batch Processing</i> 2 Batches	<i>Order Pro- cessing</i> 1 Order	<i>Customer Service</i> 1 Customer	<i>Total</i>
Total activity for the order.....					
Manufacturing overhead:					
Indirect labor.....	\$ 150.00	\$120.00	\$ 20.00	\$ 0	\$ 290.00
Factory equipment depreciation.....	1,000.00	34.00	0	0	1,034.00
Factory administration.....	25.00	14.00	25.00	150.00	214.00
Selling and administrative:					
Wages and salaries.....	100.00	40.00	160.00	1,600.00	1,900.00
Depreciation.....	0.00	6.00	10.00	38.00	54.00
Marketing expenses.....	<u>112.50</u>	<u>0.00</u>	<u>60.00</u>	<u>675.00</u>	<u>847.50</u>
Total overhead cost.....	<u>\$1,387.50</u>	<u>\$214.00</u>	<u>\$275.00</u>	<u>\$2,463.00</u>	<u>\$4,339.50</u>

Example: \$0.60 per direct labor-hour × 250 direct labor-hours = \$150.00.

*250 direct labor-hours = 0.25 direct labor-hour per seat × 1,000 seats.

Exercise 8A-3 (continued)

The action analysis report for the order can be constructed using the row totals from the activity rate table, organized according to the ease of adjustment codes:

Sales (1,000 units × \$20 per unit).....		\$20,000.00
Green costs:		
Direct materials (1,000 units × \$8.50 per unit)...	<u>\$8,500.00</u>	<u>8,500.00</u>
Green margin.....		11,500.00
Yellow costs:		
Direct labor (1,000 units × \$6.00 per unit).....	6,000.00	
Indirect labor.....	290.00	
Marketing expenses.....	<u>847.50</u>	<u>7,137.50</u>
Yellow margin.....		4,362.50
Red costs:		
Factory equipment depreciation.....	1,034.00	
Factory administration.....	214.00	
Selling and administrative wages and salaries..	1,900.00	
Selling and administrative depreciation.....	<u>54.00</u>	<u>3,202.00</u>
Red margin.....		<u>\$ 1,160.50</u>

Exercise 8A-4 (60 minutes)

1. First-stage allocations of overhead costs to the activity cost pools:

<i>Distribution of Resource Consumption Across Activity Cost Pools</i>					
	<i>Direct Labor Support</i>	<i>Order Pro- cessing</i>	<i>Customer Support</i>	<i>Other</i>	<i>Totals</i>
Wages and salaries.....	40%	30%	20%	10%	100%
Other overhead costs....	30%	10%	20%	40%	100%

	<i>Direct Labor Support</i>	<i>Order Pro- cessing</i>	<i>Customer Support</i>	<i>Other</i>	<i>Totals</i>
Wages and salaries.....	\$120,000	\$ 90,000	\$60,000	\$30,000	\$300,000
Other overhead costs....	<u>30,000</u>	<u>10,000</u>	<u>20,000</u>	<u>40,000</u>	<u>100,000</u>
Total cost.....	<u>\$150,000</u>	<u>\$100,000</u>	<u>\$80,000</u>	<u>\$70,000</u>	<u>\$400,000</u>

Example: 40% of \$300,000 is \$120,000.

Other entries in the table are determined in a similar manner.

Exercise 8A-4 (continued)

2. The activity rates are computed by dividing the costs in the cells of the first-stage allocation above by the total activity from the top of the column.

	<i>Direct Labor Support</i>	<i>Order Processing</i>	<i>Customer Support</i>
Total activity.....	20,000 DLHs	400 orders	200 customers
Wages and salaries...	\$6.00	\$225.00	\$300.00
Other overhead costs	<u>1.50</u>	<u>25.00</u>	<u>100.00</u>
Total cost.....	<u>\$7.50</u>	<u>\$250.00</u>	<u>\$400.00</u>

Example: $\$120,000 \div 20,000 \text{ DLHs} = \6.00 per DLH .

Direct labor support wages and salaries from the first-stage allocation above.

3. The overhead cost for the order is computed as follows:

	<i>Direct Labor Support</i>	<i>Order Pro- cessing</i>	<i>Cus- tomer Support</i>	<i>Total</i>
	20	1	1	
	DLHs	order	customer	
Activity.....	DLHs	order	customer	
Wages and salaries.....	\$120.00	\$225.00	\$300.00	\$645.00
Other overhead costs.....	<u>30.00</u>	<u>25.00</u>	<u>100.00</u>	<u>155.00</u>
Total cost.....	<u>\$150.00</u>	<u>\$250.00</u>	<u>\$400.00</u>	<u>\$800.00</u>

Example: $20 \text{ DLHs} \times \$6.00 \text{ per DLH} = \120 .

Activity rate for direct labor support wages and salaries from part (2) above.

Exercise 8A-4(continued)

4. The report can be constructed using the column totals at the bottom of the overhead cost analysis in part (3) above.

Customer Margin—ABC Analysis

Sales (10 units × \$300 per unit).....		\$3,000
Costs:		
Direct materials (\$180 per unit × 10 units).....	\$1,800	
Direct labor (10 units × \$50 per unit).....	500	
Direct labor support overhead (see part 3 above).....	150	
Order processing overhead (see part 3 above).....	250	
Customer support overhead (see part 3 above).....	<u>400</u>	<u>3,100</u>
Customer margin.....		<u>\$ (100)</u>

5. The action analysis report can be constructed using the row totals from the activity rate table, organized according to the ease of adjustment codes:

Sales (\$300 per unit × 10 units).....		\$3,000
Green costs:		
Direct materials (\$180 per unit × 10 units).....	<u>\$1,800</u>	<u>1,800</u>
Green margin.....		1,200
Yellow costs:		
Direct labor (10 units × \$50 per unit).....	500	
Wages and salaries (see part 3 above).....	<u>645</u>	<u>1,145</u>
Yellow margin.....		55
Red costs:		
Other overhead costs (see part 3 above).....	<u>155</u>	<u>155</u>
Red margin.....		<u>\$ (100)</u>

Exercise 8A-4 (continued)

6. While the company appears to have incurred a loss on its business with Shenzhen Enterprises, caution must be exercised. The green margin on the business was \$1,200. Advanced Products Corporation really incurred a loss on this business only if at least \$1,200 of the yellow and red costs would have been avoided if the Shenzhen Enterprises order had been rejected. For example, we don't know what specific costs are included in the "Other overhead" category. If these costs are committed fixed costs that cannot be avoided in the short run, then the company would be worse off if the Shenzhen Enterprises order had not been accepted.

Suppose that Shenzhen Enterprises will be submitting a similar order every year. As a general policy, the company might consider turning down this business in the future. Costs that cannot be avoided in the short run, may be avoided in the long run through the budgeting process or in some other manner. However, if the Shenzhen Enterprises business is turned down, management must make sure that at least \$1,200 of the yellow and red costs are really eliminated or the resources represented by those costs are really redeployed to the constraint. If these costs remain unchanged, then the company would be better off accepting than rejecting business from the Shenzhen Enterprises in the future.

Problem 8A-5 (30 minutes)

1. The detailed cost analysis of local commercials appears below:

	<i>Activity Rates</i>		
	<i>Animation Concept</i>	<i>Animation Production</i>	<i>Contract Ad- ministration</i>
Technical staff salaries.....	\$4,000	\$6,000	\$1,600
Animation equipment depreciation	360	1,125	0
Administrative wages and salaries	1,440	150	4,800
Supplies costs.....	120	300	160
Facility costs.....	120	150	240
Total.....	<u>\$6,040</u>	<u>\$7,725</u>	<u>\$6,800</u>

	<i>Animation Concept</i>	<i>Animation Production</i>	<i>Contract Ad- ministration</i>	<i>Total</i>
Activity level.....	25 proposals	5 minutes	10 contracts	
Technical staff salaries.....	\$100,000	\$30,000	\$16,000	\$146,000
Animation equipment depreciation...	9,000	5,625	0	14,625
Administrative wages and salaries...	36,000	750	48,000	84,750
Supplies costs.....	3,000	1,500	1,600	6,100
Facility costs.....	3,000	750	2,400	6,150
Total cost.....	<u>\$151,000</u>	<u>\$38,625</u>	<u>\$68,000</u>	<u>\$257,625</u>

Example: \$4,000 per proposal × 25 proposals = \$100,000.

Problem 8A-5 (continued)

2. The action analysis report is constructed by using the row totals from the cost report in part (1) above:

Sales.....		\$180,000
Green costs:		
Supplies costs.....	\$ 6,100	<u>6,100</u>
Green margin.....		173,900
Yellow costs:		
Administrative wages and salaries...	<u>84,750</u>	<u>84,750</u>
Yellow margin.....		89,150
Red costs:		
Technical staff salaries.....	146,000	
Animation equipment depreciation...	14,625	
Facility costs.....	<u>6,150</u>	<u>166,775</u>
Red margin.....		<u><u>\$(77,625)</u></u>

Problem 8A-5 (continued)

3. At first glance, it appears that the company is losing money on local commercials. However, the action analysis report indicates that if this market segment were dropped, most of the costs are likely to continue being incurred. The nature of the technical staff salaries is clearly critical because it makes up the bulk of the costs. Management has suggested that the technical staff is the company's most valuable asset and that it would be the last to go in case of financial difficulties. Nevertheless, there are at least two situations in which these costs would be relevant. First, dropping the local commercial market segment may reduce future hiring of new technical staff. This would have the effect of reducing future spending and therefore would reduce the company's costs. Second, if technical staff time is a constraint, dropping the local commercial market segment would allow managers to shift technical staff time to other, presumably more profitable work. However, if this is the case, there are better ways to determine which projects should get technical staff attention. This subject will be covered in Chapter 13 in the section on utilization of scarce resources.

Finally, the cost of the animation concept at the proposal stage is a major drag on the profitability of the local commercial market. The activity-based costing system, as currently designed, assumes that all project proposals require the same effort. This may not be the case. Proposals for local commercials may be far less elaborate than proposals for major special effects animation sequences for motion pictures. If management *has* been putting about the same amount of effort into every proposal, the above activity-based costing analysis suggests that this may be a mistake. Management may want to consider cutting back on the effort going into animation concepts for local commercials at the project proposal stage. Of course, this may lead to an even lower success rate on bids for local commercials.

Appendix 8B

Using a Modified Form of Activity-Based Costing to Determine Product Costs for External Reports

Exercise 8B-1 (45 minutes)

1. The predetermined overhead rate is computed as follows:

$$\text{Predetermined overhead rate} = \frac{\$325,000}{50,000 \text{ DLHs}} = \$6.50 \text{ per DLH}$$

The unit product costs under the company's traditional costing system are computed as follows:

	<i>Deluxe</i>	<i>Standard</i>
	<i>e</i>	<i>d</i>
Direct materials.....	\$72.00	\$53.00
Direct labor.....	12.00	9.60
Manufacturing overhead (1.0 DLH × \$6.50 per DLH; 0.8 DLH × \$6.50 per DLH).....	<u>6.50</u>	<u>5.20</u>
Unit product cost.....	<u>\$90.50</u>	<u>\$67.80</u>

Exercise 8B-1 (continued)

2. The activity rates are computed as follows:

<i>Activities</i>	<i>(a) Estimated Overhead Cost</i>	<i>(b) Total Expected Activity</i>	<i>(a) ÷ (b) Activity Rate</i>
Supporting direct labor....	\$200,000	50,000 DLHs	\$4 per DLH
Batch setups.....	\$75,000	300 setups	\$250 per setup
Safety testing.....	\$50,000	100 tests	\$500 per test

Manufacturing overhead is assigned to the two products as follows:

Deluxe Product:

<i>Activity Cost Pool</i>	<i>(a) Activity Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) ABC Cost</i>
Supporting direct labor.....	\$4 per DLH	10,000 DLHs	\$ 40,000
Batch setups.....	\$250 per setup	200 setups	50,000
Safety testing.....	\$500 per test	30 tests	<u>15,000</u>
Total.....			<u>\$105,000</u>

Standard Product:

<i>Activity Cost Pool</i>	<i>(a) Activity Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) ABC Cost</i>
Supporting direct labor.....	\$4 per DLH	40,000 DLHs	\$160,000

Batch setups.....	\$250 per setup	100 setups	25,000
Safety testing.....	\$500 per test	70 tests	<u>35,000</u>
Total.....			<u>\$220,000</u>

Exercise 8B-1 (continued)

Activity-based costing unit product costs are computed as follows:

	<i>Deluxe</i>	<i>Standard</i>
Direct materials.....	\$72.00	\$53.00
Direct labor.....	12.00	9.60
Manufacturing overhead (\$105,000 ÷ 10,000 units; \$220,000 ÷ 50,000 units).....	<u>10.50</u>	<u>4.40</u>
Unit product cost.....	<u>\$94.50</u>	<u>\$67.00</u>

Exercise 8B-2 (45 minutes)

- The unit product costs under the company's conventional costing system would be computed as follows:

	<i>Rascon</i>	<i>Parcel</i>	<i>Total</i>
Number of units produced (a).....	20,000	80,000	
Direct labor-hours per unit (b).....	<u>0.40</u>	<u>0.20</u>	
Total direct labor-hours (a) × (b).....	<u>8,000</u>	<u>16,000</u>	24,000
Total manufacturing overhead (a).....	\$576,000		
Total direct labor-hours (b).....	24,000 DLHs		
Predetermined overhead rate (a) ÷ (b).....	\$24.00 per DLH		
	<i>Rascon</i>	<i>Parcel</i>	
Direct materials.....	\$13.00	\$22.00	
Direct labor.....	6.00	3.00	
Manufacturing overhead applied:			
0.40 DLH per unit × \$24.00 per DLH.....	9.60		
0.20 DLH per unit × \$24.00 per DLH.....		<u>4.80</u>	
Unit product cost.....	<u>\$28.60</u>	<u>\$29.80</u>	

Exercise 8B-2 (continued)

2. The unit product costs with the proposed ABC system can be computed as follows:

<i>Activity Cost Pool</i>	<i>Estimated Overhead Cost*</i>	<i>(b) Expected Activity</i>	<i>(a) ÷ (b) Activity Rate</i>
Labor related.....	\$288,000	24,000 direct labor-hours	\$12.00 per direct labor-hour
Engineering design...	<u>\$288,000</u>	6,000 engineering-hours	<u>\$48.00</u>
	<u>\$576,000</u>		

*The total manufacturing overhead cost is split evenly between the two activity cost pools.

Manufacturing overhead is assigned to the two products as follows:

Rascon:

<i>Activity Cost Pool</i>	<i>(a) Activity Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) ABC Cost</i>
Labor related.....	\$12 per DLH	8,000 DLHs	\$ 96,000
Engineering design.	\$48 per engineering-hour	3,000 engineering-hours	<u>144,000</u>
Total.....			<u>\$240,000</u>

Parcel:

<i>Activity Cost Pool</i>	<i>(a) Activity Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) ABC Cost</i>
Labor related.....	\$12 per DLH	16,000 DLHs	\$192,000
Engineering design.	\$48 per engineering-hour	3,000 engineering-hours	<u>144,000</u>
Total.....			<u>\$336,000</u>

Exercise 8B-2 (continued)

The unit product costs combine direct materials, direct labor, and overhead costs:

	<i>Rascon</i>	<i>Parcel</i>
Direct materials.....	\$13.00	\$22.00
Direct labor.....	6.00	3.00
Manufacturing overhead ($\$240,000 \div 20,000$ units; $\$336,000 \div 80,000$ units).....	<u>12.00</u>	<u>4.20</u>
Unit product cost.....	<u>\$31.00</u>	<u>\$29.20</u>

3. The unit product cost of the high-volume product, Parcel, declines under the activity-based costing system, whereas the unit product cost of the low-volume product, Rascon, increases. This occurs because half of the overhead is applied on the basis of engineering design hours instead of direct labor-hours. When the overhead was applied on the basis of direct labor-hours, most of the overhead was applied to the high-volume product. However, when the overhead is applied on the basis of engineering-hours, more of the overhead cost is shifted over to the low-volume product. Engineering-hours is a product-level activity, so the higher the volume, the lower the unit cost and the lower the volume, the higher the unit cost.

Problem 8B-4 (60 minutes)

1. a. When direct labor-hours are used to apply overhead cost to products, the company's predetermined overhead rate would be:

$$\begin{aligned} \text{Predetermined overhead rate} &= \frac{\text{Manufacturing overhead cost}}{\text{Direct labor-hours}} \\ &= \frac{\$1,800,000}{36,000 \text{ DLHs}} = \$50 \text{ per DLH} \end{aligned}$$

b.

	<i>Model</i>	
	<i>X200</i>	<i>X99</i>
Direct materials.....	\$ 72	\$ 50
Direct labor:		
\$10 per hour × 1.8 hours and 0.9 hours...	18	9
Manufacturing overhead:		
\$50 per hour × 1.8 hours and 0.9 hours...	<u>90</u>	<u>45</u>
Total unit product cost.....	<u>\$180</u>	<u>\$104</u>

2. a. Predetermined overhead rates for the activity cost pools:

	(a)	(b)	(a) ÷ (b)
<i>Activity Cost Pool</i>	<i>Estimated Total Cost</i>	<i>Estimated Total Activity</i>	<i>Activity Rate</i>
Machine setups....	\$360,000	150 setups	\$2,400 per setup
Special processing.....	\$180,000	12,000 MHs	\$15 per MH
General factory.....	\$1,260,000	36,000 DLHs	\$35 per DLH

Problem 8B-4 (continued)

The overhead applied to each product can be determined as follows:

Model X200

<i>Activity Cost Pool</i>	<i>(a) Predetermined Overhead Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) Overhead Applied</i>
Machine setups.....	\$2,400 per setup	50 setups	\$120,000
Special processing.....	\$15 per MH	12,000 MHs	180,000
General factory.....	\$35 per DLH	9,000 DLHs	<u>315,000</u>
Total manufacturing overhead cost (a).			<u>\$615,000</u>
Number of units produced (b).....			5,000
Overhead cost per unit (a) ÷ (b).....			<u>\$123.00</u>

Model X99

<i>Activity Cost Pool</i>	<i>(a) Predetermined Overhead Rate</i>	<i>(b) Activity</i>	<i>(a) × (b) Overhead Applied</i>
Machine setups.....	\$2,400 per setup	100 setups	\$ 240,000
Special processing.....	\$15 per MH	0 MHs	0
General factory.....	\$35 per DLH	27,000 DLHs	<u>945,000</u>
Total manufacturing overhead cost (a).			<u>\$1,185,000</u>
Number of units produced (b).....			30,000
Overhead cost per unit (a) ÷ (b).....			<u>\$39.50</u>

Problem 8B-4 (continued)

- b. The unit product cost of each model under activity-based costing would be computed as follows:

	<i>Model</i>	
	<i>X200</i>	<i>X99</i>
Direct materials.....	\$ 72.00	\$50.00
Direct labor:		
\$10 per DLH × 1.8 DLHs, 0.9 DLHs.....	18.00	9.00
Manufacturing overhead (above).....	<u>123.00</u>	<u>39.50</u>
Total unit product cost.....	<u>\$213.00</u>	<u>\$98.50</u>

Comparing these unit cost figures with the unit costs in Part 1(b), we find that the unit product cost for Model X200 has increased from \$180 to \$213, and the unit product cost for Model X99 has decreased from \$104 to \$98.50.

3. It is especially important to note that, even under activity-based costing, 70% of the company's overhead costs continue to be applied to products on the basis of direct labor-hours:

Machine setups (number of setups). .	\$ 360,000	20%
Special processing (machine-hours).	180,000	10
General factory (direct labor-hours)...	<u>1,260,000</u>	<u>70</u>
Total overhead cost.....	<u>\$1,800,000</u>	<u>100%</u>

Thus, the shift in overhead cost from the high-volume product (Model X99) to the low-volume product (Model X200) occurred as a result of reassigning only 30% of the company's overhead costs.

The increase in unit product cost for Model X200 can be explained as follows: First, where possible, overhead costs have been traced to the products rather than being lumped together and spread uniformly over production. Therefore, the special processing costs, which are traceable to Model X200, have all been assigned to Model X200 and none assigned to Model X99 under the activity-based costing approach. It is common in industry to have some products that require special handling or special processing of some type. This is especially true in modern factories that produce a variety of products. Activity-based costing provides a vehicle for assigning these costs to the appropriate products.

Problem 8B-4 (continued)

Second, the costs associated with the batch-level activity (machine setups) have also been assigned to the specific products to which they relate. These costs have been assigned according to the number of setups completed for each product. However, because a batch-level activity is involved, another factor affecting unit costs comes into play. That factor is batch size. Some products are produced in large batches and some are produced in small batches. *The smaller the batch, the higher the per unit cost of the batch activity.* In the case at hand, the data can be analyzed as follows:

Model X200:

Cost to complete one setup [see 2(a)].....	\$2,400	(a)
Number of units processed per setup (5,000 units per setup ÷ 50 setups = 100 units).....	100 units	(b)
Setup cost per unit (a) ÷ (b).....	\$24	

Model X99:

Cost to complete one setup (above).....	\$2,400	(a)
Number of units processed per setup (30,000 units per setup ÷ 100 setups = 300 units).....	300 units	(b)
Setup cost per unit (a) ÷ (b).....	\$8	

Thus, the cost per unit for setups is three times as great for Model X200, the low-volume product, as it is for Model X99, the high-volume product. Such differences in cost are obscured when direct labor-hours (or any other volume measure) is used as a basis for applying overhead cost to products.

In sum, overhead cost has shifted from the high-volume product to the low-volume product as a result of more appropriately assigning some costs to the products on the basis of the activities involved, rather than on the basis of direct labor-hours.

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Case 8B-5 (90 minutes)

1. a. The predetermined overhead rate would be computed as follows:

$$\frac{\text{Expected manufacturing overhead cost}}{\text{Estimated direct labor-hours}} = \frac{\$2,200,000}{50,000 \text{ DLHs}} = \$44 \text{ per DLH}$$

- b. The unit product cost per pound, using the company's present costing system, would be:

	<i>Kenya Dark</i>	<i>Viet Select</i>
Direct materials (given).....	\$4.50	\$2.90
Direct labor (given).....	0.24	0.24
Manufacturing overhead:		
0.02 DLH × \$44 per DLH.....	<u>0.88</u>	<u>0.88</u>
Total unit product cost.....	<u>\$5.62</u>	<u>\$4.02</u>

2. a. Overhead rates by activity center:

<i>Activity Center</i>	<i>(a) Estimated Overhead Costs</i>	<i>(b) Expected Activity</i>	<i>(a) ÷ (b) Predetermined Overhead Rate</i>
Purchasing.....	\$560,000	2,000 orders	\$280 per order
Material handling.	\$193,000	1,000 setups	\$193 per setup
Quality control.....	\$90,000	500 batches	\$180 per batch
Roasting.....	\$1,045,000	95,000 hours	\$11 per hour
Blending.....	\$192,000	32,000 hours	\$6 per hour
Packaging.....	\$120,000	24,000 hours	\$5 per hour

Case 8B-5 (continued)

Before we can determine the amount of overhead cost to assign to the products we must first determine the activity for each of the products in the six activity centers. The necessary computations follow:

Number of purchase orders:

Kenya Dark: $80,000 \text{ pounds} \div 20,000 \text{ pounds per order} = 4 \text{ orders}$

Viet Select: $4,000 \text{ pounds} \div 500 \text{ pounds per order} = 8 \text{ orders}$

Number of batches:

Kenya Dark: $80,000 \text{ pounds} \div 5,000 \text{ pounds per batch} = 16 \text{ batches}$

Viet Select: $4,000 \text{ pounds} \div 500 \text{ pounds per batch} = 8 \text{ batches}$

Number of setups:

Kenya Dark: $16 \text{ batches} \times 2 \text{ setups per batch} = 32 \text{ setups}$

Viet Select: $8 \text{ batches} \times 2 \text{ setups per batch} = 16 \text{ setups}$

Roasting hours:

Kenya Dark: $1.5 \text{ hours} \times (80,000 \text{ pounds} \div 100 \text{ pounds}) = 1,200 \text{ hours}$

Viet Select: $1.5 \text{ hours} \times (4,000 \text{ pounds} \div 100 \text{ pounds}) = 60 \text{ hours}$

Blending hours:

Kenya Dark: $0.5 \text{ hour} \times (80,000 \text{ pounds} \div 100 \text{ pounds}) = 400 \text{ hours}$

Viet Select: $0.5 \text{ hour} \times (4,000 \text{ pounds} \div 100 \text{ pounds}) = 20 \text{ hours}$

Packaging hours:

Kenya Dark: $0.3 \text{ hour} \times (80,000 \text{ pounds} \div 100 \text{ pounds}) = 240 \text{ hours}$

Viet Select: $0.3 \text{ hour} \times (4,000 \text{ pounds} \div 100 \text{ pounds}) = 12 \text{ hours}$

Case 8B-5 (continued)

The overhead applied to each product can be determined as follows:

Kenya Dark

	<i>Activity Rate</i>	<i>Expected Activity</i>	<i>Amount</i>
Purchasing.....	\$280 per order	4 orders	\$ 1,120
Material handling.....	\$193 per setup	32 setups	6,176
Quality control.....	\$180 per batch	16 batches	2,880
Roasting.....	\$11 per roasting hour	1,200 roasting hours	13,200
Blending.....	\$6 per blending hour	400 blending hours	2,400
Packaging.....	\$5 per packaging hour	240 packaging hours	<u>1,200</u>
Total.....			<u>\$26,976</u>

Viet Select

	<i>Activity Rate</i>	<i>Expected Activity</i>	<i>Amount</i>
Purchasing.....	\$280 per order	8 orders	\$2,240
Material handling.....	\$193 per setup	16 setups	3,088
Quality control.....	\$180 per batch	8 batches	1,440
Roasting.....	\$11 per roasting hour	60 roasting hours	660
Blending.....	\$6 per blending hour	20 blending hours	120
Packaging.....	\$5 per packaging hour	12 packaging hours	<u>60</u>
Total.....			<u>\$7,608</u>

Case 8B-5 (continued)

- b. According to the activity-based costing system, the manufacturing overhead cost per pound is:

	<i>Kenya Dark</i>	<i>Viet Select</i>
Total overhead cost assigned (above) (a)...	\$26,976	\$7,608
Number of pounds manufactured (b).....	80,000	4,000
Cost per pound (a) ÷ (b).....	\$0.34	\$1.90

- c. The unit product costs according to the activity-based costing system are:

	<i>Kenya Dark</i>	<i>Viet Select</i>
Direct materials (given).....	\$4.50	\$2.90
Direct labor (given).....	0.24	0.24
Manufacturing overhead.....	<u>0.34</u>	<u>1.90</u>
Total unit product cost.....	<u>\$5.08</u>	<u>\$5.04</u>

3. MEMO TO THE PRESIDENT: Analysis of JSI's data shows that several activities other than direct labor drive the company's manufacturing overhead costs. These activities include purchase orders issued, number of setups for material processing, and number of batches processed. The company's present costing system, which relies on direct labor time as the sole basis for assigning overhead cost to products, significantly undercosts low-volume products, such as the Viet Select coffee, and significantly overcosts high-volume products, such as our Kenya Dark coffee.

An implication of the activity-based costing analysis is that our low-volume products may not be covering the costs of the manufacturing resources they use. For example, Viet Select coffee is currently priced at \$5.03 per pound (\$4.02 plus 25% markup), but this price is below its activity-based cost of \$5.04 per pound. Under our present costing and pricing system, our high-volume products, such as our Kenya Dark coffee, may be subsidizing our low-volume products. Some adjustments in prices may be required. However, before taking such an action, an action analysis report (discussed in Appendix 8A) should be prepared.

Case 8B-5 (continued)

ALTERNATIVE SOLUTION:

Most students will compute the manufacturing overhead cost per pound of the two coffees as shown above. However, the per pound cost can also be computed as shown below. *This alternative approach provides additional insight into the data and facilitates emphasis of some points made in the chapter.*

	Kenya Dark		Viet Select	
	Total	Per Pound (÷ 80,000)	Total	Per Pound (÷ 4,000)
Purchasing.....	\$ 1,120	\$0.014	\$2,240	\$0.560
Material handling.	6,176	0.077	3,088	0.772
Quality control.....	2,880	0.036	1,440	0.360
Roasting.....	13,200	0.165	660	0.165
Blending.....	2,400	0.030	120	0.030
Packaging.....	<u>1,200</u>	<u>0.015</u>	<u>60</u>	<u>0.015</u>
Total.....	<u>\$26,976</u>	<u>\$0.337</u>	<u>\$7,608</u>	<u>\$1.902</u>

Note particularly how batch size impacts unit cost data. For example, the cost to the company to process a purchase order is \$280, regardless of how many pounds of coffee are contained in the order. Twenty thousand pounds of the Kenya Dark coffee are purchased per order (with four orders per year), and just 500 pounds of the Viet Select coffee are purchased per order (with eight orders per year). Thus, the purchase order cost *per pound* for the Kenya Dark coffee is just 1.4 cents, whereas the purchase order cost *per pound* for the Viet Select coffee is 40 times as much, or 56 cents. As stated in the text, this is one reason why unit costs of low-volume products, such as the Viet Select coffee, increase so dramatically when activity-based costing is used.

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