

Capítulo 10 Differential Analysis

Exercise 11-1 (15 minutes)

Item	Case A		Case B	
	Relevant	Irrelevant	Relevant	Irrelevant
a. Sales revenue	X			X
b. Direct materials.....	X		X	
c. Direct labor	X			X
d. Variable manufacturing overhead	X			X
e. Depreciation— Model B100 machine		X		X
f. Book value— Model B100 machine		X		X
g. Disposal value— Model B100 machine		X	X	
h. Market value—Model B300 machine (cost)	X		X	
i. Fixed manufacturing overhead (general)		X		X
j. Variable selling expense	X			X
k. Fixed selling expense.....	X			X
l. General administrative overhead	X			X

Exercise 11-2 (30 minutes)

1. The financial (disadvantage) of discontinuing the racing bikes is computed as follows:

Lost contribution margin		\$(27,000)
Fixed costs that can be avoided:		
Advertising, traceable	\$ 6,000	
Salary of the product-line manager	<u>10,000</u>	<u>16,000</u>
Financial (disadvantage) of discontinuing the Racing Bikes		<u>\$(11,000)</u>

The depreciation of the special equipment is a sunk cost and is not relevant to the decision. The common costs are allocated and will continue regardless of whether or not the racing bikes are discontinued; thus, they are not relevant to the decision.

Alternative Solution:

	<i>Current Total</i>	<i>Total If Racing Bikes Are Dropped</i>	<i>Difference: Net Operating Income Increase or (Decrease)</i>
Sales	\$300,000	\$240,000	\$(60,000)
Variable expenses	<u>120,000</u>	<u>87,000</u>	<u>33,000</u>
Contribution margin	<u>180,000</u>	<u>153,000</u>	<u>(27,000)</u>
Fixed expenses:			
Advertising, traceable	30,000	24,000	6,000
Depreciation on special equipment*	23,000	23,000	0
Salaries of product-line managers	35,000	25,000	10,000
Common allocated costs	<u>60,000</u>	<u>60,000</u>	<u>0</u>
Total fixed expenses	<u>148,000</u>	<u>132,000</u>	<u>16,000</u>
Net operating income	<u>\$ 32,000</u>	<u>\$ 21,000</u>	<u>\$(11,000)</u>

*Includes pro-rated loss on the special equipment if it is disposed of.

Exercise 11-2 (continued)

2. No, production and sale of the racing bikes should not be discontinued.

3. The segmented report can be improved by eliminating the allocation of the common fixed expenses. Following the format introduced in Chapter 6 for a segmented income statement, a better report would be:

	<i>Total</i>	<i>Dirt Bikes</i>	<i>Mountain Bikes</i>	<i>Racing Bikes</i>
Sales.....	\$300,000	\$90,000	\$150,000	\$60,000
Variable manufacturing and selling expenses	<u>120,000</u>	<u>27,000</u>	<u>60,000</u>	<u>33,000</u>
Contribution margin	<u>180,000</u>	<u>63,000</u>	<u>90,000</u>	<u>27,000</u>
Traceable fixed expenses:				
Advertising.....	30,000	10,000	14,000	6,000
Depreciation of special equipment..	23,000	6,000	9,000	8,000
Salaries of the product-line managers.....	<u>35,000</u>	<u>12,000</u>	<u>13,000</u>	<u>10,000</u>
Total traceable fixed expenses	<u>88,000</u>	<u>28,000</u>	<u>36,000</u>	<u>24,000</u>
Product line segment margin	92,000	<u>\$35,000</u>	<u>\$ 54,000</u>	<u>\$ 3,000</u>
Common fixed expenses.....	<u>60,000</u>			
Net operating income	<u>\$ 32,000</u>			

Exercise 11-3 (30 minutes)

1.	<i>Per Unit Differential Costs</i>	<i>15,000 units</i>	
	<u>Make</u> <u>Buy</u>	<u>Make</u>	<u>Buy</u>
Cost of purchasing.....			\$525,000
Direct materials	\$14	\$210,000	
Direct labor	10	150,000	
Variable manufacturing overhead.....	3	45,000	
Fixed manufacturing overhead, traceable ¹	2	30,000	
Fixed manufacturing overhead, common	—	—	
Total costs	<u>\$29</u> <u>\$35</u>	<u>\$435,000</u>	<u>\$525,000</u>
Financial (disadvantage) of buying the carburetors			
	<u>\$(6)</u>	<u>\$(90,000)</u>	

¹ Only the supervisory salaries of \$2 per unit (= \$6 per unit × 1/3) can be avoided if the carburetors are purchased. The remaining book value of the special equipment is a sunk cost; hence, the \$4 per unit depreciation expense (= \$6 × 2/3) per unit is not relevant to this decision.

2. Based on these data, the company should reject the offer and should continue to produce the carburetors internally.

3.	<i>Make</i>	<i>Buy</i>
Cost of purchasing (see requirement 1).....		\$525,000
Cost of making (see requirement 1)	\$435,000	
Opportunity cost—segment margin foregone on a potential new product line	<u>150,000</u>	—
Total cost	<u>\$585,000</u>	<u>\$525,000</u>
Financial advantage of buying the carburetors		<u>\$60,000</u>

4. Given the new assumption, the company should accept the offer and purchase the carburetors from the outside supplier.

Exercise 11-4 (15 minutes)

1. Only the incremental costs and benefits are relevant. In particular, only the variable manufacturing overhead and the cost of the special tool are relevant overhead costs in this situation. The other manufacturing overhead costs are fixed and are not affected by the decision.

	<i>Per Unit</i>	<i>Total for 20 Bracelets</i>
Incremental revenue	<u>\$169.95</u>	<u>\$3,399.00</u>
Incremental costs:		
Variable costs:		
Direct materials	\$ 84.00	1,680.00
Direct labor	45.00	900.00
Variable manufacturing overhead.....	4.00	80.00
Special filigree	<u>2.00</u>	<u>40.00</u>
Total variable cost	<u>\$135.00</u>	2,700.00
Fixed costs:		
Purchase of special tool		<u>250.00</u>
Total incremental cost.....		<u>2,950.00</u>
Financial advantage of accepting the special order.....		<u>\$ 449.00</u>

2. Even though the price for the special order is below the company's regular price for such an item, the company would be better off accepting the order. This conclusion would not necessarily follow if the special order affected the regular selling price of bracelets or if it required the use of a constrained resource.

Exercise 11-7 (10 minutes)

1. The financial advantage (disadvantage) of further processing each product is calculated as follows:

	<i>A</i>	<i>B</i>	<i>C</i>
Selling price after further processing	\$20	\$13	\$32
Selling price at the split-off point	<u>16</u>	<u>8</u>	<u>25</u>
Incremental revenue per pound or gallon	<u>\$ 4</u>	<u>\$ 5</u>	<u>\$ 7</u>
Total quarterly output in pounds or gallons	× 15,000	× 20,000	× 4,000
Total incremental revenue.....	\$60,000	\$100,000	\$28,000
Total incremental processing costs	<u>63,000</u>	<u>80,000</u>	<u>36,000</u>
Financial advantage (disadvantage) of further processing	<u>\$(3,000)</u>	<u>\$ 20,000</u>	<u>\$(8,000)</u>

2. Products A and C should be sold at the split-off point. Only product B should be processed further.

Exercise 11-9 (15 minutes)

1. The financial advantage is computed as follows:

	<i>Per Unit</i>	<i>15,000 Units</i>
Incremental sales	<u>\$14.00</u>	<u>\$210,000</u>
Incremental costs:		
Direct materials	5.10	76,500
Direct labor.....	3.80	57,000
Variable manufacturing overhead	1.00	15,000
Variable selling and administrative	<u>1.50</u>	<u>22,500</u>
Total incremental costs	<u>11.40</u>	<u>171,000</u>
Financial advantage of accepting the special order .	<u>\$ 2.60</u>	<u>\$ 39,000</u>

The fixed costs are not relevant to the decision because they will be incurred regardless of whether the special order is accepted or rejected.

2. The relevant cost is \$1.50 (the variable selling and administrative expenses). All other variable costs are sunk because the units have already been produced. The fixed costs are not relevant because they will not change in total as a consequence of the price charged for the left-over units.

Exercise 11-16 (30 minutes)

1. The relevant costs of a hunting trip would be:

Travel expense (100 miles @ \$0.21 per mile).....	\$21
Shotgun shells	20
One bottle of whiskey	<u>15</u>
Total	<u>\$56</u>

This answer assumes that Bill would not be drinking the bottle of whiskey if he stayed home. It also assumes that the resale values of the camper, pickup truck, and boat are not affected by taking one more hunting trip.

The money lost in the poker game is not relevant because Bill would have played poker even if he did not go hunting. He plays poker every weekend.

The other costs are sunk at the point at which the decision is made to go on another hunting trip.

2. If Bill gets lucky and bags another two ducks, all of his costs are likely to be the same as they were on his last trip. Therefore, it doesn't cost him anything to shoot the last two ducks. If he were to use more shotgun shells to kill more ducks, then he would incur additional costs related to the shotgun shells. However, in this particular case he bagged two more ducks than on his prior trip using the same number of shotgun shells.
3. In a decision of whether to give up hunting entirely, more of the costs listed by John are relevant. If Bill did not hunt, he would not need to pay for: gas, oil, and tires; shotgun shells; the hunting license; and the whiskey. In addition, he would be able to sell his camper, equipment, boat, and possibly pickup truck, the proceeds of which would be considered relevant in this decision. The original costs of these items are not relevant, but their resale values are relevant.

These three requirements illustrate the slippery nature of costs. A cost that is relevant in one situation can be irrelevant in the next. None of the costs are relevant when we compute the cost of bagging two additional ducks; some of them are relevant when we compute the cost of a hunting trip; and more of them are relevant when we consider the possibility of giving up hunting.

Problem 11-18 (60 minutes)

1. Selling price per unit	\$32
Variable expenses per unit.....	<u>18</u> *
Contribution margin per unit.....	<u>\$14</u>
* $\$10.00 + \$4.50 + \$2.30 + \$1.20 = \$18.00$	
Increased sales in units (60,000 units \times 25%)	15,000
Contribution margin per unit	<u>\times \$14</u>
Incremental contribution margin	\$210,000
Less added fixed selling expenses	<u>80,000</u>
Financial advantage of the investment	<u>\$130,000</u>

Yes, the increase in fixed selling expenses would be justified.

2. Variable manufacturing cost per unit	\$16.80 *
Import duties per unit	1.70
Permits and licenses ($\$9,000 \div 20,000$ units).....	0.45
Shipping cost per unit.....	<u>3.20</u>
Break-even price per unit	<u>\$22.15</u>

* $\$10 + \$4.50 + \$2.30 = \16.80

3. The relevant cost is \$1.20 per unit, which is the variable selling expense per Dak. Because the irregular units have already been produced, all production costs (including the variable production costs) are sunk. The fixed selling expenses are not relevant because they will be incurred whether or not the irregular units are sold. Depending on how the irregular units are sold, the variable expense of \$1.20 per unit may not even be relevant. For example, the units may be disposed of through a liquidator without incurring the normal variable selling expense.
4. If the plant operates at 30% of normal levels, then only 3,000 units will be produced and sold during the two-month period:

$$60,000 \text{ units per year} \times 2/12 \text{ years} = 10,000 \text{ units}$$

$$10,000 \text{ units} \times 30\% = 3,000 \text{ units produced and sold}$$

Problem 11-18 (continued)

Given this information, the simplest approach to solving 4a, 4b, and 4c is:

Contribution margin lost if the plant is closed (3,000 units × \$14 per unit)		\$(42,000)
Fixed costs that can be avoided if the plant is closed:		
Fixed manufacturing overhead cost (\$300,000 × 2/12 = \$50,000; \$50,000 × 40%)	\$20,000	
Fixed selling cost (\$210,000 × 2/12 = \$35,000; \$35,000 × 20%)	<u>7,000</u>	<u>27,000</u>
Financial (disadvantage) of closing the plant		<u><u>\$(15,000)</u></u>

Some students will take a longer approach such as that shown below:

	<i>Continue to Operate</i>	<i>Close the Plant</i>
Sales (3,000 units × \$32 per unit)	\$ 96,000	\$ 0
Variable expenses (3,000 units × \$18 per unit)	<u>54,000</u>	<u>0</u>
Contribution margin	<u>42,000</u>	<u>0</u>
Fixed expenses:		
Fixed manufacturing overhead cost:		
\$300,000 × 2/12	50,000	
\$300,000 × 2/12 × 60%		30,000
Fixed selling expense:		
\$210,000 × 2/12	35,000	
\$210,000 × 2/12 × 80%		<u>28,000</u>
Total fixed expenses	<u>85,000</u>	<u>58,000</u>
Net operating income (loss)	<u><u>\$(43,000)</u></u>	<u><u>\$(58,000)</u></u>

- 4d. The company should not close the plant for two months because it will be \$15,000 worse off if it closes.

Problem 11-18 (continued)

5. The relevant costs are those that can be avoided by purchasing from the outside supplier. These costs are:

Variable manufacturing cost per unit.....	\$16.80
Fixed manufacturing overhead cost ($\$300,000 \times 75\% = \$225,000$; $\$225,000 \div 60,000$ units)	3.75
Variable selling expense	<u>0.40</u>
Total avoidable cost per unit.....	<u>\$20.95</u>

To be acceptable, the outside supplier's price must be *less* than \$20.95 per unit.