

Budgeting and Decision Making Exercises III

Larry M. Walther; Christopher J. Skousen



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Problem 1

Carpet Clean manufactures a chemical carpet cleaner. The company was formed during the current year. As a result, there was no beginning inventory. Management is evaluating performance and inventory management issues, and desires to know both net income and ending inventory under generally accepted accounting principles (absorption costing) as well as variable costing methods. Relevant facts are as follows:

Selling price per gallon	\$	11.00
Variable manufacturing cost per gallon		2.00
Variable SG&A costs per gallon		2.25
Fixed manufacturing costs	\$	2,900,000
Fixed SG&A		470,000
Total gallons produced		1,625,000
Total gallons sold		1,500,000

Worksheet 1

Absorption Costing

Variable manufacturing costs		\$	-
Fixed manufacturing costs			-
Cost of goods manufactured		\$	-
Cost of goods sold			-
Ending inventory		\$	-
Sales		\$	-
Cost of goods sold			-
Gross profit		\$	-
Selling, general, & administrative costs			
Variable	\$	-	-
Fixed		-	-
Net income		\$	-

Variable Costing

Ending inventory		\$	-
Sales		\$	-
Variable manufacturing costs			-
Variable manufacturing margin		\$	-
Variable SG&A			-
Contribution margin		\$	-
Fixed expenses			
Manufacturing	\$	-	-
SG&A		-	-
Net income		\$	-

Solution 1

Absorption Costing

Variable manufacturing costs ($\$2 \times 1,625,000$)		\$ 3,250,000
Fixed manufacturing costs		<u>2,900,000</u>
Cost of goods manufactured		\$ 6,150,000
Cost of goods sold ($\$6,150,000 \times (1,500,000/1,625,000)$)		<u>5,676,923</u>
Ending inventory ($\$6,150,000 \times (125,000/1,625,000)$)		<u><u>473,077</u></u>
Sales ($1,500,000 \times \$11$)		\$ 16,500,000
Cost of goods sold		<u>5,676,923</u>
Gross profit		\$ 10,823,077
Selling, general, & administrative costs		
Variable ($1,500,000 \times \$2.25$)	\$ 3,375,000	
Fixed	<u>470,000</u>	<u>3,845,000</u>
Net income		<u><u>\$ 6,978,077</u></u>

Variable Costing

Ending inventory ($\$2 \times 125,000$)		<u><u>\$ 250,000</u></u>
Sales ($1,500,000 \times \$11$)		\$ 16,500,000
Variable manufacturing costs ($\$2 \times 1,625,000$)		<u>3,250,000</u>
Variable manufacturing margin		\$ 13,250,000
Variable SG&A ($1,500,000 \times \$2.25$)		<u>3,375,000</u>
Contribution margin		\$ 9,875,000
Fixed expenses		
Manufacturing	\$ 2,900,000	
SG&A	<u>470,000</u>	<u>3,370,000</u>
Net income		<u><u>\$ 6,505,000</u></u>

Note that the difference in income between the two methods, for this first year of operation, is also the difference in ending inventory. Also discuss why income is positive under absorption costing and negative under variable costing.

Problem 2

FairWay Golf Carts manufacturers and sells a golf carts. The carts usually sell for \$8,000 per unit. The company normally sells units as quickly as manufactured and does not maintain a finished goods inventory. However, during the most recent year, the company produced 21,000 units, but only sold 19,000. A foreign customer has requested to buy the other 2,000 units for delivery on December 31 of the year current year. The offered price is \$6,125 per unit for all 2,000 units. Below are absorption-costing based calculations of ending inventory and net income, based on the 19,000 units already sold.

Variable manufacturing costs ($\$5,250 \times 21,000$)		\$	110,250,000
Fixed manufacturing costs			<u>41,000,000</u>
Cost of goods manufactured		\$	151,250,000
Cost of goods sold ($\$146,250,000 \times (19,000/21,000)$)			<u>136,845,238</u>
Ending inventory ($\$146,250,000 \times (2,000/21,000)$)		\$	<u><u>14,404,762</u></u>
Sales ($19,000 \times \$8,000$)		\$	152,000,000
Cost of goods sold			<u>136,845,238</u>
Gross profit		\$	15,154,762
Selling, general, & administrative costs			
Variable ($19,000 \times \$150$)	\$	2,850,000	
Fixed		<u>9,800,000</u>	<u>12,650,000</u>
Net income		\$	<u><u>2,504,762</u></u>

Prepare a revised absorption-costing based income statement, assuming acceptance of the 2,000 unit order. Also prepare variable-costing income statements (with and without the order). Compare the results and evaluate whether the order should be accepted.

Worksheet 2

Absorption Costing

Variable Costing (19,000 units)

Variable Costing (21,000 units)

Solution 2

Absorption Costing

Sales (19,000 X \$8,000) + (2,000 X \$6,125)		\$	164,250,000
Cost of goods sold			<u>151,250,000</u>
Gross profit		\$	13,000,000
Selling, general, & administrative costs			
Variable (21,000 X \$150)	\$	3,150,000	
Fixed		<u>9,800,000</u>	<u>12,950,000</u>
Net income		\$	<u><u>50,000</u></u>

Variable Costing (19,000 units)

Sales (19,000 X \$8,000)		\$	152,000,000
Variable manufacturing costs (19,000 X \$5,250)			<u>99,750,000</u>
Variable manufacturing margin		\$	52,250,000
Variable SG&A (19,000 X \$150)			<u>2,850,000</u>
Contribution margin		\$	49,400,000
Fixed expenses			
Manufacturing	\$	41,000,000	
SG&A		<u>9,800,000</u>	<u>50,800,000</u>
Net income		\$	<u><u>(1,400,000)</u></u>

Variable Costing (21,000 units)

Sales (19,000 X \$8,000) + (2,000 X \$6,125)		\$	164,250,000
Variable manufacturing costs (21,000 X \$5,250)			<u>110,250,000</u>
Variable manufacturing margin		\$	54,000,000
Variable SG&A (21,000 X \$150)			<u>3,150,000</u>
Contribution margin		\$	50,850,000
Fixed expenses			
Manufacturing	\$	41,000,000	
SG&A		<u>9,800,000</u>	<u>50,800,000</u>
Net income		\$	<u><u>50,000</u></u>

Under absorption costing, net income decreases by accepting the special order. The company's profit decreases from \$2,504,762 to \$50,000. Under variable costing, the company goes from a loss of \$1,400,000 to a profit of \$50,000. Note that the profit is the same under both methods when there is not beginning or ending inventory.

The essential difference is that fixed manufacturing overhead is all charged to expense under variable costing, but is partially carried as an asset in inventory under absorption costing. There is no single right answer as to whether the order should be accepted. The key point is to think critically about cost allocations, and how they can influence the decision-making logic that should be applied.

Problem 3

The Grain Company started many years ago producing a single product. Over the years it has grown to produce many diverse consumer products ranging from foods to paper goods. Currently, the corporation is barely making a profit and the price of its stock has languished. Division managers have traditionally been incentivized with stock options and awards. However, management is evaluating a new bonus plan based on segment profits within each division. Below are 20X7 facts about the Wheat Products Division, which generates 15% of overall corporate revenue. The Wheat Products Division has two key products – whole wheat and white flour.

Total sales of whole wheat and white flour	\$11,437,500
Traceable, controllable, Wheat Products Division fixed costs	2,562,500
Traceable, uncontrollable, Wheat Products Division fixed costs	1,800,000
Non-traceable, controllable, Wheat Products Division fixed costs	375,000
Non-traceable, uncontrollable, Wheat Products Division fixed costs	875,000
Variable selling, general, & administrative costs	2,262,500
Variable product costs	5,425,000
General corporate expenses for all divisions	2,000,000

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Prepare a contribution income statement for the aggregated Wheat Products Division fixed costs (one column). If the division manager is to be evaluated on controllable contribution margin, would the Wheat Products Division fixed costs manager appear to be entitled to a bonus?

Worksheet 3

20X7 Divisional Report for Wheat Products
Contribution Income Statement

Sales	\$ 11,437,500
Less:	

Solution 3

20X7 Divisional Report for Wheat Products
Contribution Income Statement

Sales	\$ 11,437,500
Less:	
Variable product costs	5,425,000
Variable selling, general, and administrative costs	2,262,500
Total variable costs	<u>\$ 7,687,500</u>
Contribution margin	3,750,000
Less: Controllable fixed costs (\$2,562,500 + \$375,000)	<u>2,937,500</u>
Controllable contribution margin	\$ 812,500
Less: Uncontrollable fixed costs (\$1,800,000 + \$875,000)	<u>2,675,000</u>
Segment margin	<u>\$ (1,862,500)</u>

If the manager is evaluated on controllable contribution margin, then a profit is evident. However, great care must be taken in this evaluation as there are other costs that are incurred in the operation. The total segment margin is negative, and this number does not yet include consideration of general corporate expenses.

Problem 4

Abby Corporation has three business segments: paint, wallpapers, and tools. The company’s assumed cost of capital is 12%. Financial information about each segment follows.

	Paint Segment	Wallpaper Segment	Tools Segment
Segment operating income	\$ 1,625,000	\$ 1,187,500	\$ 2,250,000
Invested capital	13,250,000	8,750,000	18,750,000

- a) Prepare an analysis of residual income for each segment, and note which segment has the highest residual income.
- b) Assuming a reduction in assumed cost of capital to 7%, prepare a revised analysis of residual income. Does this revised assumption alter the rankings?

Worksheet 4

a)

	Paint Segment	Wallpaper Segment	Tools Segment
Segment operating income	\$ -	\$ -	\$ -
Residual income	<u>\$ -</u>	<u>\$ -</u>	<u>\$ -</u>

b)

Solution 4

a)

	Paint Segment	Wallpaper Segment	Tools Segment
Segment operating income	\$ 1,625,000	\$ 1,187,500	\$ 2,250,000
Less: Assumed cost of capital			
\$13,250,000 X 12%	1,590,000		
\$8,750,000 X 12%		1,050,000	
\$18,750,000 X 12%	-	-	2,250,000
Residual income	<u>\$ 35,000</u>	<u>\$ 137,500</u>	<u>\$ -</u>

The Wallpaper segment has the highest residual income.

b)

	Paint Segment	Wallpaper Segment	Tools Segment
Segment operating income	\$ 1,625,000	\$ 1,187,500	\$ 2,250,000
Less: Assumed cost of capital			
\$13,250,000 X 7%	927,500		
\$8,750,000 X 7%		612,500	
\$18,750,000 X 7%	-	-	1,312,500
Residual income	<u>\$ 697,500</u>	<u>\$ 575,000</u>	<u>\$ 937,500</u>

The tools segment has the highest residual income and paint has now surpassed wallpaper.

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Problem 5

Lewis Custom Manufacturing produces kitchen cabinets in a two-step production process – cutting and sanding. The manufacturing center is supported by two service centers – a health clinic and a janitorial service. The following table reveals certain facts about each activity:

	Health Clinic	Janitorial Service	Cutting Department	Sanding Department
Employees	3	6	15	20
Square footage	3,600	1,800	36,000	24,000
Cost incurred	\$720,000	\$500,000	\$2,800,000	\$3,200,000

- a) Using the direct method, allocate the service department costs to production. The clinic costs are to be allocated based on employees, and the janitorial costs are to be allocated based on the square footage.
- b) Using the step method, allocate the service department costs to production. The clinic costs are to be allocated based on employees, and the janitorial costs are to be allocated based on the square footage. The first step will be to allocate clinic costs. The clinic employees maintain their space and do not rely upon the janitorial service. However, janitorial employees occasionally sustain an injury and utilize the clinic.

Worksheet 5

a)

	Health Clinic	Janitorial Service	Cutting Department	Sanding Department
Cost incurred	\$ 720,000	\$ 500,000	\$ 2,800,000	\$ 3,200,000
Clinic allocation	-	-	-	-
Janitorial allocation	-	-	-	-
Total cost	\$ -	\$ -	\$ -	\$ -

Clinic allocations:

Janitorial allocations:

b)

	Health Clinic	Janitorial Service	Cutting Department	Sanding Department
Cost incurred	\$ 720,000	\$ 500,000	\$ 2,800,000	\$ 3,200,000
Clinic allocation	-	-	-	-
Janitorial allocation	-	-	-	-
Total cost	<u>\$ -</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ -</u>

Clinic allocations:

Janitorial allocations:

Solution 5

a)

	Health Clinic	Janitorial Service	Cutting Department	Sanding Department
Cost incurred	\$ 720,000	\$ 500,000	\$ 2,800,000	\$ 3,200,000
Clinic allocation	(720,000)	-	308,571	411,429
Janitorial allocation	-	(500,000)	300,000	200,000
Total cost	<u>\$ -</u>	<u>\$ -</u>	<u>\$ 3,408,571</u>	<u>\$ 3,811,429</u>

Clinic allocations:

$$\text{To cutting} = \$720,000 \times (15/(15 + 20))$$

$$\text{To sanding} = \$720,000 \times (20/(15 + 20))$$

Janitorial allocations:

$$\text{To cutting} = \$500,000 \times (36,000/(36,000 + 24,000))$$

$$\text{To sanding} = \$500,000 \times (24,000/(36,000 + 24,000))$$

b)

	Health Clinic	Janitorial Service	Cutting Department	Sanding Department
Cost incurred	\$ 720,000	\$ 500,000	\$ 2,800,000	\$ 3,200,000
Clinic allocation	(720,000)	105,366	263,415	351,220
Janitorial allocation	-	(605,366)	363,220	242,146
Total cost	\$ -	\$ -	\$ 3,426,634	\$ 3,793,366

Clinic allocations:

To janitorial = $\$720,000 \times (6 / (6 + 15 + 20))$

To cutting = $\$720,000 \times (15 / (6 + 15 + 20))$

To sanding = $\$720,000 \times (20 / (6 + 15 + 20))$

Janitorial allocations:

To cutting = $\$605,366 \times (36,000 / (24,000 + 36,000))$

To sanding = $\$605,366 \times (24,000 / (24,000 + 36,000))$

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Problem 6

Sonic produces hair dryers. Each unit sells for \$75. During 20X7, the company produced 55,000 units, and sold 48,000 units. Beginning inventory contained a total of 4,000 units. Production and SG&A costs have been stable for many years. Assume the per units costs in beginning and ending inventory are identical. Per unit cost information follows:

Direct materials cost	18.75
Direct labor cost	12.50
Variable factory overhead	15.00
Variable SG&A	6.25

Annual fixed manufacturing overhead is \$220,000. Annual fixed SG&A totals \$250,000.

- Determine the number of units in ending inventory, and calculate the total carrying cost using both variable and absorption costing.
- Calculate 20X7 net income using variable costing.
- Calculate 20X7 net income using absorption costing.

Worksheet 6

a)

b)

c)

Solution 6

- a) Ending inventory contained 11,000 units. Simply, inventory increased by 7,000 units (55,000 produced – 48,000 sold). The beginning inventory of 4,000 units, plus the 7,000 unit increase, yields an ending inventory of 11,000 units.

Under variable costing, the ending inventory would contain only the variable manufacturing costs ($\$18.75 + \$12.50 + \$15.00 = \46.25 per unit). $11,000 \text{ units} \times \$46.25 = \$508,750$ ending inventory.

Under absorption costing, the ending inventory would contain the variable manufacturing costs ($\$46.25$ per unit) plus allocated fixed manufacturing overhead ($\$220,000/55,000 \text{ units} = \4 per unit). $11,000 \text{ units} \times (\$46.25 + \$4) = \$552,750$ ending inventory.

- b)

Sales (48,000 X \$75)		\$	3,600,000
Variable manufacturing costs (48,000 X \$46.25)			<u>2,220,000</u>
Variable manufacturing margin		\$	1,380,000
Variable SG&A (48,000 X \$6.25)			<u>300,000</u>
Contribution margin		\$	1,080,000
Fixed expenses			
Manufacturing	\$	220,000	
SG&A		<u>250,000</u>	<u>470,000</u>
Net income			<u><u>\$ 610,000</u></u>

- c)

Sales (48,000 X \$75)		\$	3,600,000
Cost of goods sold (48,000 X (\$46.25 + \$4))			<u>2,412,000</u>
Gross profit		\$	1,188,000
Selling, general, & administrative costs			
Variable SG&A (48,000 X \$6.25)	\$	300,000	
Fixed		<u>250,000</u>	<u>550,000</u>
Net income			<u><u>\$ 638,000</u></u>

Problem 7

Kitchen Appliances Store has three major departments: Dishwashers, Ovens, and Refrigerators. The appliance department has been a consistent money loser, as typified by the following recent monthly operating report:

	Total	Dishwashers	Ovens	Refrigerators
Sales	\$ 6,630,000	\$ 1,950,000	\$ 3,120,000	\$ 1,560,000
Variable expenses	<u>5,460,000</u>	<u>1,560,000</u>	<u>2,600,000</u>	<u>1,300,000</u>
Contribution margin	\$ 1,170,000	\$ 390,000	\$ 520,000	\$ 260,000
Fixed expenses	<u>793,000</u>	<u>260,000</u>	<u>208,000</u>	<u>325,000</u>
Income (loss)	<u>\$ 377,000</u>	<u>\$ 130,000</u>	<u>\$ 312,000</u>	<u>\$ (65,000)</u>

Management is considering a strategy to exit the refrigerator business. If this strategy is followed, the floor space currently dedicated to refrigerator will be used to expand the dishwasher showroom space. It is believed that dishwasher sales will increase by 20%.

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Fixed expenses that can be avoided by abandoning refrigerator sales include the salary of a service tech and the elimination of a delivery van. The two components total \$25,000 per month. The remaining fixed costs relate to facilities expenses and employees that will be diverted to dishwasher sales activities.

Evaluate the impact on total profitability of exiting dishwasher sales. How can overall profits be negatively impacted by abandoning an “unprofitable” product line?

Worksheet 7

	Total	Dishwashers	Ovens	Refrigerators
Sales	\$ -	\$ -	\$ -	\$ -
Variable expenses	-	-	-	-
Contribution margin	\$ -	\$ -	\$ -	\$ -
Fixed expenses	-	-	-	-
Income (loss)	<u>\$ -</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ -</u>

Solution 7

Below is a revision of the monthly operating report to reflect the elimination of refrigerators. Dishwasher sales and variable expenses are each increased by 20%. \$300,000 of the refrigerator unit’s fixed costs are transferred to dishwashers.

	Total	Dishwashers	Ovens	Refrigerators
Sales	\$ 5,460,000	\$ 2,340,000	\$ 3,120,000	\$ -
Variable expenses	4,472,000	1,872,000	2,600,000	-
Contribution margin	\$ 988,000	\$ 468,000	\$ 520,000	\$ -
Fixed expenses	768,000	560,000	208,000	-
Income (loss)	<u>\$ 220,000</u>	<u>\$ (92,000)</u>	<u>\$ 312,000</u>	<u>\$ -</u>

Note that eliminating refrigerator sales results in a decrease in overall profitability. Fixed costs of \$300,000 continue, and the additional margin from selling more dishwashers is not sufficient to offset the loss of contribution margin that was being generated from refrigerators. This results in a net loss in the dishwasher segment. Great care is needed to make good decisions about eliminating product lines.