

## Vol. 1, Chapter 9 – Basic Cost Concepts

### Problem 1: Solution

- | <u>Taxable Income</u> | <u>Tax Rate</u>                           |
|-----------------------|---|
| \$0 - \$20,000        | 10%                                       |
| \$20,000 - \$50,000   | \$2,000 + 20% of the amount over \$20,000 |
| > \$50,000            | \$8,000 + 30% of the amount over \$50,000 |
- 
- |       |                 |   |     |   |                                       |
|-------|-----------------|---|-----|---|---------------------------------------|
| First | \$20,000        | × | .10 | = | \$ 2,000                              |
| Next  | \$30,000        | × | .20 | = | \$ 6,000                              |
| Next  | <u>\$10,000</u> | × | .30 | = | <u>\$ 3,000</u>                       |
| Total | <u>\$60,000</u> |   |     |   | <u>\$11,000</u> = Total Tax Liability |
2. Federal Income Taxes / Taxable Income = Average Tax Rate  
 = \$11,000 / \$60,000 = 18.33%

### Problem 2: Solution

The opportunity cost of building a new lodging facility on this land is the best foregone opportunity of selling the land today for \$500,000 net of tax.

		<u>Cash Flow</u>
Selling price	\$500,000	\$500,000
Cost	100,000	
Gain on sale	400,000	
Incr. tax rate	0.3	- <u>120,000</u>
Net cash flow		<u>\$380,000</u>

### Problem 3: Solution

1. The direct expenses of the rooms department total \$21,450. These expenses include the payroll and related expenses of \$20,000 and other expenses of \$1,450.
2. Overhead expenses total \$77,356. These expenses include all expense other than the direct expenses of the profit centers. Therefore, the overhead expenses include the undistributed operating expenses, fixed charges, and income taxes.
3. Costs controllable by the GM and by those under his/her supervision include all expenses prior to "gross operating profit." Thus, the undistributed operating expenses and direct costs of the profit centers are the controllable expenses.
4. The fixed costs are the fixed charges of rent, property taxes, insurance, interest, and depreciation. Other expenses also may be fixed, but further investigation would be required.
5. The cost of sales is considered to be a variable expense.

#### Problem 4: Solution

1.

	<u>Electric Expense</u>	<u>Occupancy %</u>
High Month (August)	\$7,200	78%
Low Month (December)	\$5,500	50%
	\$1,700	28%

$$\begin{aligned} & \text{Mixed Cost Difference / Occupancy \% Difference} = \\ & \text{Variable Cost per 1\% of Occupancy} \\ & = \$1,700 / 28\% = \underline{\$60.71} \end{aligned}$$

2. December Occupancy %  $\times$  Variable Cost = Total Variable Cost of Electric Expenses for December  
 $= 50\% \times \$60.71 = \underline{\$3,035.50}$

$$\begin{aligned} & \text{Total Electric Expense for December - Variable Electric} \\ & \text{Expense for December} = \text{Total Fixed Cost of Electric} \\ & \text{Expense for December} \\ & = \$5,500 - \$3,035.50 = \underline{\$2,464.50} \end{aligned}$$

$$\begin{aligned} & \text{August Occupancy \%} \times \text{Variable Cost} = \text{Total Variable Cost} \\ & \text{of Electric Expenses for August} \\ & = 78\% \times \$60.71 = \underline{\$4,735.38} \end{aligned}$$

$$\begin{aligned} & \text{Total Electric Expense for August - Variable Electric} \\ & \text{Expense for August} = \text{Total Fixed Cost of Electric Expense} \\ & \text{for August} \\ & = \$7,200 - \$4,735.38 = \underline{\$2,464.62} \end{aligned}$$

3. Occupancy %  $\times$  Variable Cost = Total Variable Cost of Electric Expenses at 62%  
 $= 62\% \times \$60.71 = \underline{\$3,764.02}$

$$\begin{aligned} & \text{Variable Cost of Electric Expenses at 62\%} + \text{Fixed Cost of} \\ & \text{Electric Expense} = \text{Estimated Electric Expense at 62\%} \\ & = \$3,764.02 + \$2,464.50 = \underline{\$6,228.52} \end{aligned}$$

The answer for January of \$6,228.52 is based on applying the estimated fixed cost and variable cost based on the high-low two point method. Since January was neither the low or the high month we can expect there will be some difference. The difference is only \$28.52, which suggests in this case the high-low method worked reasonably well.

### Problem 5: Solution

1.		Number of <u>Customers</u>	<u>Labor Costs</u>
	July	5,000	\$20,500
	February	<u>2,400</u>	<u>\$10,450</u>
	Difference	<u>2,600</u>	<u>\$10,050</u>

Variable cost per customer:  $\$10,050 / 2,600 = \$3.8654$

2. Variable labor cost:  $\$3.8654 \times 5,000 = \$19,327$   
Fixed labor cost:  $\$20,500 - \$19,327 = \$1,173$
3.  $(3,900 \times \$3.8654) + \$1,173 = \$16,248$

### Problem 6: Solution

1. Indifference Point:

Variable Cost Percentage  $\times$  Sales = Fixed Lease Cost

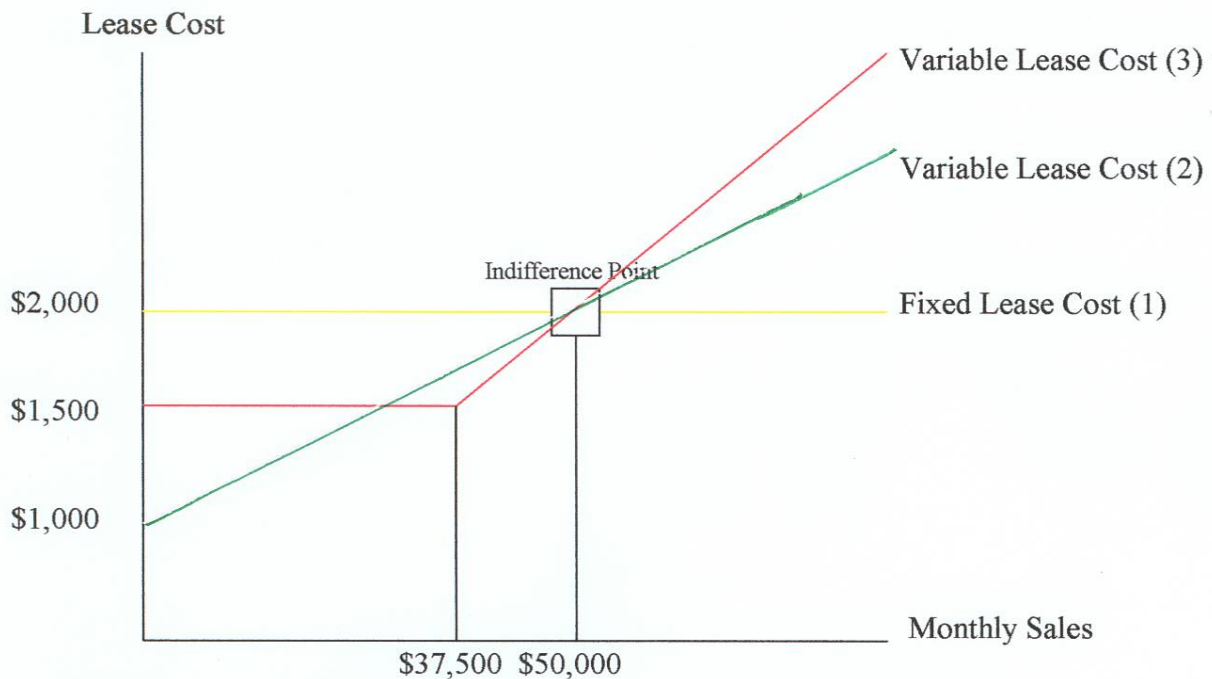
$$.02(\text{Sales}) + \$1,000 = \$2,000$$

$$\text{Sales} = \underline{\$50,000}$$

$$[.04(\text{Sales} - \$37,500)] + \$1,500 = \$2,000$$

$$\text{Sales} = \underline{\$50,000}$$

- 2.



**Problem 6: Solution** (continued)

3. Alternative 1:  
\$2,000 = Total Lease Cost

Alternative 2:  
.02(\$80,000) + \$1,000 = \$2,600 = Total Lease Cost

Alternative 3:  
[.04(\$80,000 - \$37,500)] + \$1,500 = \$3,200 = Total Lease Cost

Alternative 1 is recommended.

**Problem 7: Solution**

1.	<u>Cost</u>	<u>Fixed</u>	<u>Variable</u>
Payroll:			
Salaries	Fixed	\$15,000.00	
Wages	Variable		\$20.00
Employee benefits	Mixed	\$6,200.00	\$1.50
Supplies	Variable		\$1.00
Utilities	Mixed	\$4,000.00	\$2.00
Other operating costs	Mixed	\$2,000.00	\$1.00
Building rent	Fixed	\$8,000.00	
Interest expense	Fixed	\$2,000.00	
Insurance	Fixed	\$3,000.00	

2. Salaries + Building rent + Interest expense + Insurance =  
Fixed Costs  
\$15,000 + \$8,000 + \$2,000 + \$3,000 = \$28,000

Fixed portion of employee benefits + Fixed portion of  
utilities + Fixed portion of other operating costs = Fixed  
portion of mixed costs  
\$6,200 + \$4,000 + \$2,000 = \$ 12,200

Fixed costs + Fixed portion of mixed costs = Total fixed  
costs  
\$28,000 + \$12,200 = \$40,200

3. Wages + Supplies = Variable costs  
\$20.00 + \$1.00 = \$21.00

Variable portion of employee benefits + Variable portion of  
utilities + Variable portion of other operating costs =  
Variable portion of mixed costs per room sold  
\$1.50 + \$2.00 + \$1.00 = \$4.50

**Problem 7: Solution** (continued)

Variable costs + Variable portion of mixed costs = Total  
variable costs per room sold  
 $\$21.00 + \$4.50 = \$25.50$

4. Total costs = Fixed costs + (Variable cost per room sold ×  
room sales)

$$\text{Total costs} = \$40,200 + (\$25.50 \times \text{room sales})$$

5.  $\$40,200 + (\$25.50 \times 3,500) = \$129,450$

**Problem 8: Solution**

1. Indifference point:  $\$120,000 / .06 = \underline{\$2,000,000}$
2. A **fixed** lease is recommended.  $\$120,000 < (.06 \times \$3,000,000)$
3. Excess lease expense:  $\$200,000 \times .06 = \$12,000$   
Tax savings:  $\$12,000 \times .4 = \underline{(\$4,800)}$   
Net of Tax Cost =  $\underline{\$7,200}$

**Problem 9: Solution**

Part 1

	<u>Type of Cost</u>
1. Cost of food sold	Variable
2. Payroll costs	Mixed
3. Supplies	Variable
4. Utilities	Mixed
5. Other operating costs	Variable
6. Building rent	Fixed
7. Depreciation	Fixed

Part 2

	<u>Variable</u> <u>Amount/Unit</u>	<u>Fixed</u>
1. Cost of food sold	\$1.50	\$ 0
2. Payroll costs	.50	2,000
3. Supplies	.20	0
4. Utilities	.02	300
5. Other operating costs	.50	0
6. Building rent	0.00	1000
7. Depreciation	0.00	200
Total	<u>\$2.72</u>	<u>\$3,500</u>

Equation

$$\text{Total Costs} = \$2.72(\text{units sold}) + \$3,500$$

Check: Total Costs @ 3,000 units

$$\text{TC} = (\$2.72 \times 3,000) + \$3,500$$

$$\text{TC} = \underline{\$11,660}$$

**Problem 9: Solution** (continued)

Total costs @ 6,000 units

$$TC = (\$2.72 \times 6,000) + \$3,500$$

$$TC = \underline{\$19,820}$$

**Part 3**

Total costs @ 8,000 units

$$TC = (\$2.72 \times 8,000) + \$3,500$$

$$TC = \underline{\$25,260}$$

**Problem 10: Solution**

1. Irrelevant Costs: Labor, supplies, and utilities

2. Cost Schedule

	<u>Alternatives</u>	
	<u>Buy</u>	<u>Lease</u>
Cost of equipment	\$15,000	-
Equipment rental		
6 pmts. @ \$3,500	-	\$21,000
Salvage Value	(2,000)	-
Annual Costs:		
Interest Expense		
3 yrs. @ \$1,000	3,000	-
Repairs		
3 yrs. @ \$1500	<u>4,500</u>	<u>-</u>
Total	\$20,500	\$21,000

3. Recommendation: Buy since the total costs over three years are less than under the lease alternative.

**Problem 11: Solution**

1. Irrelevant costs: Labor, supplies, and utilities

2.

	<u>Buy</u>	<u>Lease</u>
Cost of equipment	\$20,000	-
Equipment rental		
10 payments @ \$3,000	-	\$30,000
Salvage value	(1,000)	-
Annual costs:		
Interest expense:		
\$1,500 × 5 (yrs.)	7,500	-
Repairs: \$200 × 5 (yrs.)	<u>1,000</u>	<u>-</u>
Total	\$27,500	\$30,000

3. One should recommend "buy" since the total costs over five years are less than under the "lease" alternative.

### Problem 12: Solution

1.	Labor and water are the same, so they are irrelevant.		
2.		<u>Keep Old</u>	<u>Buy New</u>
	Salvage value	\$ 300	\$2,000
	Repairs	-\$ 500	
	Maintenance	-\$2,000	-\$1,000
	Energy	-\$4,000	-\$2,500
	Purchase—new		-\$7,000
	Salvage value—new		\$2,000
	Total	<u>-\$6,200</u>	<u>-\$6,500</u>

Paul should keep the old dishwasher since future costs will be minimized by this decision.

### Problem 13: Solution

1. Irrelevant costs: annual labor costs, annual supplies costs
2. Which system should be purchased?

	<u>ABC Co.</u>	<u>XYZ Computers</u>
Initial cost	\$25,000	\$30,000
Utility costs (7 yrs.)	7,000	5,600
Maintenance (7 yrs.)	21,000	17,500
Salvage value	<u>(5,000)</u>	<u>(8,000)</u>
Net cost	<u>\$48,000</u>	<u>\$45,100</u>

A new front office computer system should be purchased from XYZ Computers since its system has the lower cost over seven years.

### Problem 14: Solution

1. There are not any sunk costs.
2. Irrelevant costs: Operator labor and supplies.
3. Comparison

	<u>A</u>	<u>B</u>
Cost	\$10,000	\$12,000
Salvage Value	(1,000)	(2,000)
Utilities	3,000	2,400
Repairs	<u>3,000</u>	<u>2,700</u>
Total	\$15,000	\$15,100

4. Recommendation: Emma should go with alternative "a" since the total cost over three years is less than alternative "b".

**Problem 15: Solution**

Double K Hotel  
Fully-Allocated Income Statement

	<u>Rooms</u>	<u>Food</u>	<u>Gift Shop</u>	<u>Total</u>
Departmental Income	\$340,000	\$145,000	\$500	\$485,500
Adm. & General	39,438	50,202	360	90,000
Sales & Marketing	30,674	39,046	280	70,000
POM & UC	30,674	39,046	280	70,000
Insurance	4,382	5,578	40	10,000
Depreciation	<u>35,056</u>	<u>44,624</u>	<u>320</u>	<u>80,000</u>
Department Income (Loss) after Allocation	<u>\$199,776</u>	<u>\$(33,496)</u>	<u>\$(780)</u>	165,500
Income Taxes				<u>50,000</u>
Net Income				<u>\$115,500</u>



**Problem 16: Solution**

Step 1

	<u>Total</u>	<u>A &amp; G</u>	<u>Sales &amp; Marketing</u>	<u>POM&amp;UC</u>	<u>Rooms</u>	<u>Food</u>	<u>Gift Shop</u>
Depreciation	\$80,000	\$2,992	\$1,992	\$4,984	\$59,816	\$9,968	\$248
Insurance	<u>10,000</u>	<u>305</u>	<u>152</u>	<u>1,143</u>	<u>6,098</u>	<u>2,287</u>	<u>15</u>
Total	<u>\$90,000</u>	<u>\$3,297</u>	<u>\$2,144</u>	<u>\$6,127</u>	<u>\$65,914</u>	<u>\$12,255</u>	<u>263</u>

Step 2

	<u>A &amp; G</u>	<u>POM&amp;UC</u>	<u>Sales &amp; Marketing</u>	<u>Rooms</u>	<u>Food</u>	<u>Gift Shop</u>
Costs recorded in dept.	\$90,000	\$70,000	\$70,000	--	--	--
Costs allocated for Step 1	<u>3,297</u>	6,127	2,144	\$65,914	\$12,255	\$263
	93,297					
Allocation of A&G	<u>(93,297)</u>	) \$ <u>6,204</u>	9,302	34,091	43,392	308
	\$ <u>-0-</u>	82,331				
Allocation of POM&UC		<u>(82,331)</u>	) <u>2,280</u>	68,368	11,395	288
		\$ <u>-0-</u>	83,726			
Allocation of Sales & Mktg.			(83,726)	<u>41,779</u>	<u>41,799</u>	<u>168</u>
			\$ <u>-0-</u>	<u>\$210,152</u>	<u>\$108,821</u>	<u>\$1,027</u>

Double K Hotel  
Fully-Allocated Income Statement

	<u>Rooms</u>	<u>Food</u>	<u>Shop</u>	<u>Total</u>
Departmental Income	\$340,000	\$145,000	\$ 500	\$485,500
Allocated Overhead	<u>210,152</u>	<u>108,821</u>	<u>1,027</u>	<u>320,000</u>
Dept. Income (Loss) after Cost Allocation	<u>\$129,848</u>	<u>\$ 36,179</u>	<u>\$ (527)</u>	165,500
Income Taxes				<u>50,000</u>
Net Income				<u>\$115,500</u>

**Problem 17: Solution**

<u>Factors</u>	<u>Options</u>		
	<u>Continue as is</u>	<u>Expand the restaurant</u>	<u>Lease the space</u>
Current dept. profit	\$ 20,000	\$ -	\$ -
Reduction of overhead costs	\$ -	\$ 10,000	\$ 5,000
Lease revenue	\$ -	\$ -	\$ 5,000
Decrease in room profits	\$ -	\$ (7,500)	\$ -
Increase in food profits	\$ -	\$ 5,000	\$ -
Cost to expand restaurant	\$ -	\$ (1,000)	\$ -
Salvage value of unneeded equip.	\$ -	\$ 500	\$ -
Total	<u>\$ 20,000</u>	<u>\$ 7,000</u>	<u>\$ 10,000</u>

Upset Ulysses should opt to continue operating the lounge as is based on the info. provided.

Note: cost factors are figured on a monthly basis.

**Problem 18: Solution**

<u>Differential Factors</u>	<u>Alternatives</u>		
	<u>Continue Lounge Operation</u>	<u>Convert to Small Meeting Room</u>	<u>Lease to BEVCO</u>
1. Reduced overhead if lounge is closed	\$ --	\$7,000	\$2,000
2. Lease to BEVCO	--	--	625
3. Impact on other departments of closing lounge:			
Rooms dept.	--	(3,000)	--
Food dept.	--	(6,000)	--
4. Cost to convert lounge	--	--	--
5. Rental for small meetings	--	3,000	--
6. Departmental profit if lounge operation continues	<u>10,000</u>	<u>--</u>	<u>--</u>
Total	<u>\$10,000</u>	<u>\$13,000</u>	<u>\$ 2,625</u>

Based on the above analysis, the lounge should be converted to a small meeting room. The operation of the small meeting room should result in an increase in pretax income of \$3,000 for Rose Inn.

**Problem 19: Solution**

	O	P	T	I	O	N	S
	Continue		Expand the		Lease the		
<u>Factors</u>	<u>as is</u>		<u>restaurant</u>		<u>space</u>		
Current dept. profit	\$20,000		\$ 0		\$ 0		
Reduction of overhead costs	0		10,000		5,000		
Lease revenue	0		0		4,583		
Decrease in room profits	0		(3,000)		0		
Increase in food profits	0		6,000		0		
Cost to expand restaurant	0		(1,000)		0		
Salvage value of unneeded equipment	0		500		0		
Total	<u>\$20,000</u>		<u>\$12,500</u>		<u>\$9,583</u>		

Peter John should opt to continue to operate the lounge as is based on the information provided. **Note:** The above analysis was prepared on a monthly basis. Alternatively, the analysis could be prepared on a five-year basis. The results will be the same.

**Problem 20: Solution**

1. Fixed cost per month

$$\text{Fixed costs} = \frac{(\Sigma y)(\Sigma x^2) - (\Sigma x)(\Sigma xy)}{n(\Sigma x^2) - (\Sigma x)^2}$$

where y = costs

x = number of rooms

$$\Sigma y = 612,652$$

$$\Sigma x = 17,508$$

$$\Sigma x^2 = 61,515,174$$

$$\Sigma xy = 2,149,293,117$$

$$(\Sigma x)^2 = 306,530,064$$

$$\begin{aligned} \text{Fixed costs} &= \frac{(612,652)(61,515,174) - (17,508)(2,149,293,117)}{5(61,515,174) - 306,530,064} \\ &= \underline{\underline{\$55,048.92}} \end{aligned}$$

2. Variable cost per room

$$y = a + bx$$

y = costs

a = fixed costs

b = variable amount

x = rooms sold for month

$$\begin{aligned} \text{Using June: } \$122,319 &= \$55,049 + 3,488b \\ \underline{\underline{\$19.286}} &= b \end{aligned}$$

3. Based on the above:

$$\text{Fixed costs} = \underline{\underline{\$55,048.92}}$$

$$\text{Variable costs} = 3,666 \times 19.286 = \underline{\underline{\$70,702.48}}$$

$$\text{Total costs} = \underline{\underline{\$125,751.40}}$$