CHAPTER 3

When you have finished studying this chapter, you should be able to:

- Briefly discuss the assumptions and limitations related to Breakeven Analysis.
- Explain the purpose of Breakeven Analysis
- Used the Breakeven equation to determine the sales level in dollars and in units.
- Explain Contribution Margin and Contribution Rate and their role in Breakeven Analysis
- Explain Variable Rate and its role in Breakeven Analysis variable
- Discuss how Sales Mix or PSTS and how they affect Breakeven Analysis in a multiple menu item scenario.

ACME Cookie Company sells cookie for $1.00 a piece. If the unit variable cost is $0.60 per cookie and the only fixed costs is a daily booth rental of $10; how many cookies must ACME sell each day in order to breakeven?

	MARGIN	
1 COOKIE SOLD =	$ 0.40	
5 COOKIE SOLD =	$ 2.00	$ 10.00
20 COKKIES SOLD =	$ 8.00	

ASSUMPTIONS:

- Costs can be easily classified as fixed or variable.
- Variable Costs vary directly with volume of sales.
- FC will remain unchanged for the period of analysis.
- Sales prices remain constant for the period of analysis.
- Sales mixes remain constant for the period of analysis.

SALES = COSTS + PROFIT

We know that costs consist of 2 components:

1. Fixed Costs 2. Variable Costs

Therefore: Sales = FC + VC + Profit

BREAKEVEN MEANS THE BUSINESS DOES NOT MAKE ANY PROFIT OR LOSES ANY MONEY.

Since Breakeven means no profit or loss, then:

Sales = FC + VC

VARIABLE RATE (VR):

Variable rate is the variable cost expressed as a percentage of sales. We know that cost % is = Costs/Sales, therefore to calculate the VC as a percentage of sales the formula would be: VC/SALES

EXAMPLE:

Sales = $20,000 VC = $12,000

THEREFORE: VR = $12,000/$20,000 = 0.60

EXAMPLE:

Unit Selling Price = $4.00 UVC = $1.20

THEREFORE: VR = $1.20/$4.00 = 0.30

* VR does not change with volume of sales.

CONTRIBUTION MARGIN (CM)

CM is the amount of sales dollar left after subtracting VC from total sales. Therefore,

CM = Sales - VC or

UCM = USP - UVC

CM is the portion of sales that are used to pay off Fixed Costs and contribute to profit.

CONTRIBUTION RATE (CR):

CR is Contribution Margin expressed as a percentage of sales. Therefore the formula would be CR = CM/SALES

EXAMPLE:

Unit Selling Price = $4.00 UFC = $1.20

THEREFORE: UCM = $4.00 - $1.20 = $2.80

and the CR = 2.80/4.00 = 0.70

Looking at our previous examples, we can see that both UVC + UCM = USP as shown below:

USP = $4.00 UVC = $1.20 UCM = $2.80

Therefore: VR = $1.20/$4.00 = 0.30

CR = $2.80/ $4.00 = 0.70

Since both CR and VR are contribution margin and variable costs expressed as percentage of sales, sales must equal 100%. Therefore, VR + CR = 1

Then CR is also equal to: 1 - VR or 1 - 0.30 = 0.70

Then VR is also equal to: 1 - CR or 1 - 0.70 = 0.30

VR = 1 - CR

VR = Unit VC/Unit Selling Price OR Total VC/Total Sales

CR = 1 - VR

CR = Unit CM/Unit Selling Price OR Total CM/Total Sales

Unit CM = UNIT SP - UNIT VC OR UNIT SP X CR

BREAKEVEN SALES IN DOLLARS

BE $ = FC / CR

EXAMPLE:

FC = $20,000 VC = $8,000 Sales = $40,000

THEREFORE: VR = $8,000/$40000 = 0.20

CR = 1 - 0.20 = 0.80

BE$ = 20000/0.80 = $25,000

BREAKEVEN SALES IN UNITS

BE UNITS = FC /U CM

BE UNITS = BE DOLLARS / USP

EXAMPLE:

FC = $20,000 UVC = $2.00 USP = $10.00

THEREFORE: UCM = $10.00 - $2.00 = $8.00

BE Units = 20000/8.00 = $2,500

CALCULATING DESIRED PROFIT

BE formula can be used to calculate the sales level, both dollars and units, required to achieve a desired level of profit.

- Sales $ to Achieve D. Profit = (FC + Profit)/CR
- Sales Units to Achieve D. Profit = (FC + Profit)/UCM

Example:

FC = $10,000 VC = $12,000

Sales = $20,000 D. Profit = $2,000

VC = 12,000/20,000 = 0.60; and CR = 1 - 0.60 = 0.40

THEREFORE:

Sales Level for $2,000 Profit

= (10,000 + 2,000)/0.40 = $30,000

PROPORTIONAL SHARE OF TOTAL SALES (PSTS) OR SALES MIX.

Percentage of Individual menu item's sales to total sales.

Example:

Menu Item A = $2,000

Menu Item B = $3,000

Menu Item C = $5,000

Total Sales = $10,000

Sales Mix:

Item A = $2,000/$10,000 = 0.20 or 20%

Item B = $3,000/$10,000 = 0.30 or 30%

Item C = $5,000/$10,000 = 0.50 or 50%

Total = = 1.00 or 100%

Total PSTS must always equal 1.00.

WEIGHTED VARIABLE RATE (WVR)

Each menu item would have its own VR. However, since sales for each item is not the same, a weight can be given to each menu item.

CALCULATING WEIGHT VARIABLE RATE:

Taking the VR of individual menu item and multiply it with its PSTS or Sales Mix.

WVR Item A = VRa * PSTSa

WVR Item B = VRb * PSTSb

By using PSTS or Sales Mix, each menu item is therefore given a weight relative to that of the TOTAL SALES.

EXAMPLE:

ITEM	SALES	PSTS	VR	WVR
A	5,000	0.25	0.40	0.10
B	7,000	0.35	0.55	0.19
C	8,000	0.40	0.70	0.28
TOTAL	20,000		1.00*****	0.57

WEIGHTED CONTRIBUTION RATE (WCR)

The weighted contribution rate can be derived after calculating the WVR. Just as the formula of CR = 1 - VR; the same can be applied to WCR = 1- WVR.

For example

The total WVR = 0.57;

Therefore, the WCR = 1 - 0.57 = 0.43.

To Calculate Breakeven Sales, assuming that FC is $60,000; we will use the same BE formula except now we will use WCR instead of just CR.

BE $ = FC/WCR

BE Sales = $60,000/0.43 = $139,534.88

	SALES	PSTS	VC	VR	WVR
A	$ 2,000	0.13	$400	0.20	0.03
B	$ 3,000	0.20	$900	0.30	0.06
C	$ 4,000	0.27	$1,600	0.40	0.11
D	$ 6,000	0.40	$3,000	0.50	0.20
	$10,000	1.00	********	*****	0.39

Therefore, WCR = 1 – 0.39 = 0.61
If Fixed Costs = $8,000
Breakeven Sales = 8000 / 0.61 = $13,114.75

PRACTICE:

	SALES	PSTS	VC	VR	WVR
A	$ 4,000		$1,000		
B	$ 5,000		$2,000		
C	$ 3,000		$1,500		
D	$ 6,000		$3,600		
		1.00	********	*****	

PRACTICE: answer

	SALES	PSTS	VC	VR	WVR
A	$ 4,000	0.22	$1,000	0.25	0.06
B	$ 5,000	0.28	$2,000	0.40	0.11
C	$ 3,000	0.17	$1,500	0.50	0.09
D	$ 6,000	0.33	$3,600	0.60	0.20
	1.00	********	*****		0.46

Therefore, WCR = 0.54

If Fixed Costs = $10,000

Breakeven Sales = $18,518.52

3.1 Given the following information, find variable rate:

a) Selling price per unit $7.65; variable cost per unit is $2.75.

b) Sales are $345,900 and variable costs are $87,000.

c) Contribution rate is .46.

3.2 Given the following information, find contribution margin:

a) Selling price per unit $6.77; variable cost per unit $2.46.

b) Selling price per unit $5.70; variable rate is .36.

c) Selling price per unit $8.90; contribution rate is .64

3.4 If sales price per unit is $4.00 and there were 12,000 units sold. What is the contribution rate if fixed cost were $20,000 and profit were $10,000?

3.5 If sales price per unit is $5.65, variable cost per unit is $1.70 and fixed cost is $34,000, calculate the breakeven point in dollar and unit sales.

3.6 If sales price per unit is $7.65 and variable rate is .62, what is the breakeven point in dollars when fixed cost is $45,000?

3.7 Fixed cost $58,000 and contribution margin is $4.00/unit, breakeven unit is?

3.8 If total sales are $45,670; profit is $7,800 and variable rate is .45, what are the fixed costs?

3.11 The management of Restaurant ABC created the following scenarios:

a) Total sales for the year amounted to 1.2 million dollars. Fixed and variable costs for the year are $800,000 and $500,000 respectively.

b) Total sales for the year amounted to $900,000 with fixed costs at $800,000 and variable costs at $600,000.

c) Total sales for the year amounted to $600,000 with fixed costs at $500,000 and variable costs at $700,000.

You are required to calculate breakeven sales and also determine if the management should stay or get out of business for each scenario.

3.12 Lynn's Pie Factory recorded the following during last period operations:

Sales	$670,000
Cost of Sales	214,400
Cost of Labor	90,500
General Expenses	200,800

Assuming that cost of labor and general expenses are 40% fixed and 60% variable, calculate the followings:

a) Profit

b) Breakeven in dollar terms

c) Dollar sales required to earn $200,000 profit.

d) If variable costs increase by $20,000, what level of sales is required to earn a profit of $200,000?