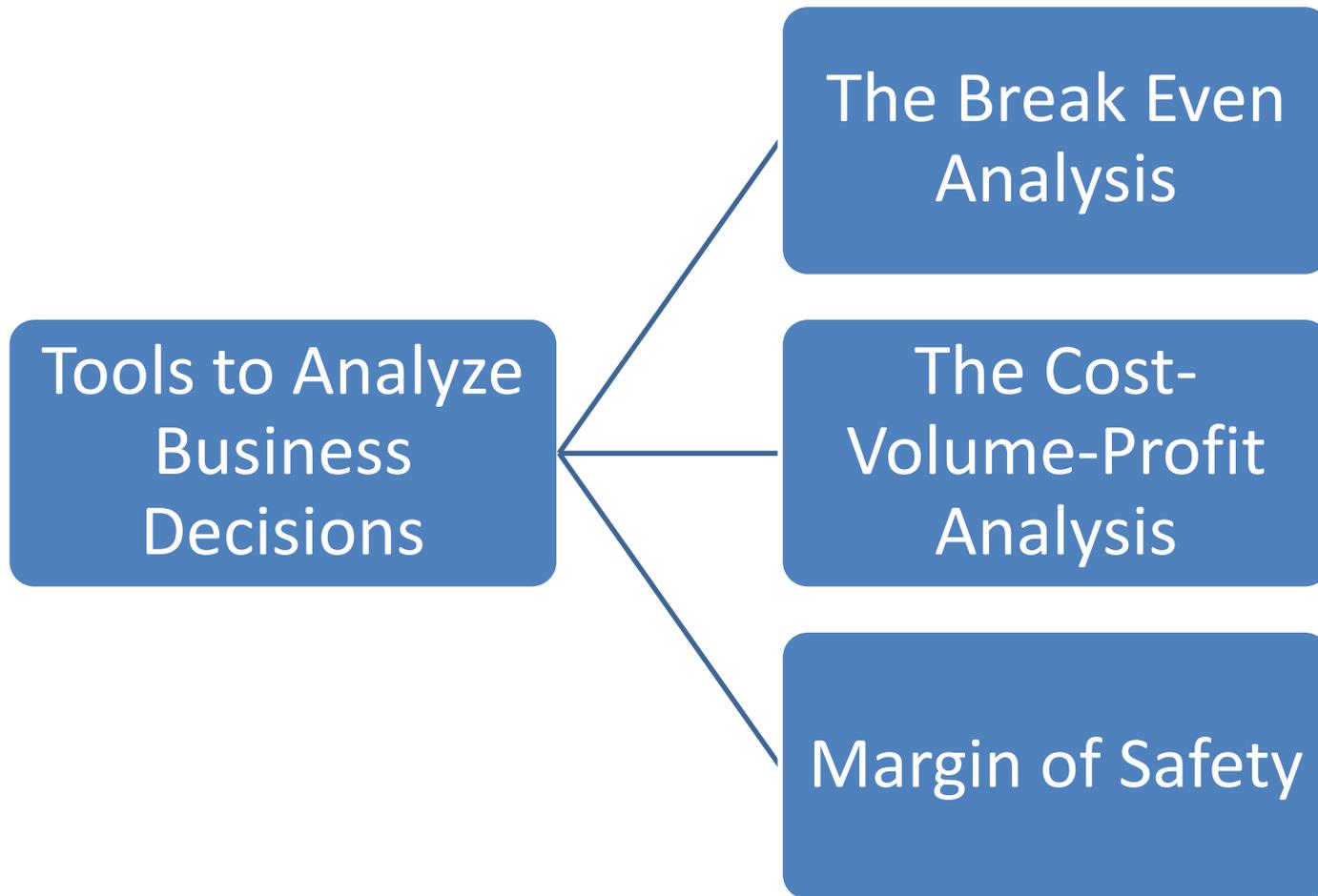


Financial Business Decisions & Break Even Analysis

Introduction

- Financial Business Decisions
 - A Decision to invest organization's financial resources in the most efficient manner
 - Before investing in the project organization needs to judge every possible alternative
 - The organization can perform financial analysis by using various tools

Introduction



Break Even Analysis

- It is a technique to judge whether the given level of production would be profitable or not
- It is conducted by finding Break Even Point of an organization
- **BREAK EVEN POINT**
 - No Profit No Loss point
 - If the revenue goes beyond this point then the organization earns profit
 - And If the revenue goes below the BEP than the organization incurs loss
 - Total Revenue = Total Cost=Break Even Point

Break Even Point

- **Assumptions of Break-Even Analysis:**

- The total costs can be classified into fixed and variable costs.
- The price of the product is assumed to be constant
- The volume of sales and volume of production are equal
- The fixed costs remain constant over the volume under consideration

- **How to Calculate BEP?**

$$\text{Profit} = \text{Sales} - \text{Cost}$$

$$\text{Profit} = \text{Sales} - (\text{Fixed Cost} + \text{Variable Cost})$$

$$\text{Profit} = \text{Sales} - \text{Fixed Cost} - \text{Variable Cost}$$

$$\text{Sales} = \text{Net Profit} + \text{Fixed Cost} + \text{Variable Cost}$$

$$SP(S) = P + FC + VC(S)$$

At the BEP profit=0

$$SP(S) = 0 + FC + VC(S)$$

$$FC = S(SP-VC)$$

$$S = FC / SP-VC$$

Where S = No. of unit sold at the BEP

SP = Selling Price per unit

P = Net Profit

FC = Fixed Cost

VC = Variable Cost

Break Even Point

$$\text{BEP (In Units)} = \frac{\text{Fixed Cost}}{\text{Selling Price per unit} - \text{Variable Cost per unit}}$$

OR

$$\text{BEP (In Units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

$$\text{BEP (In Rs.)} = \text{Break Even Units} * \text{Selling Price per unit}$$

Break Even Point

- **Example A has just opened her own pen manufacturing shop and is looking at her projected costs for the end of the first quarter, trying to determine what her break-even point is. Let's say her fixed costs for this first quarter, is \$20,000, and her variable costs have been calculated to be \$1.50 per unit. She plans on charging approximately \$2.00 per product. How many units will she have to sell to break even?**

BEP in Units = Fixed Costs / (Price of Product - Variable Costs Per Unit)

BEP in Units = \$20,000 / (\$2.00 - \$1.50)

BEP in Units = \$20,000 / (\$0.50)

BEP in Units = 40,000 units

So, in other words, A company needs to sell 40,000 products during that first quarter to break even.

Now let's try to figure out the break-even point in dollars.

Break-Even Point in \$ = Sales Price Per Unit x Break-Even Point in Units

Break-Even Point in \$ = \$2.00 x 40,000

Break-Even Point in \$ = \$80,000

So A company has to sale \$80,000 to break even

Example

- A table fan manufacturing organization has the capacity to produce 5000 fans p.a. The marginal cost of each fan is Rs. 2000 and each fan is sold for Rs.2500, while the fixed cost are Rs. 1,20,000 p.a. Calculate the BEP for output and sales

Example

- XYZ Restaurant, which sells only pepperoni pizza, the expenses per pizza are:

Fixed Cost		Variable Cost	
General Labor	1500 Rs	Flour	0.5
Rent	3000 Rs	Yeast	0.05
Insurance	200 Rs	Water	0.01
Advertising	500 Rs	Cheese	3.00
Utilities	450 Rs	Pepperoni	2.00

How many pizzas does XYZ Restaurant need to sell at \$10 each to cover all those fixed monthly expenses?

Ans : XYZ must sell 1,272 pizzas

Cost-Volume-Profit Analysis

- Cost = Cost incurred to manufacture the goods
- Volume=Volume of goods and services produced
- Profit=Profit earned by selling goods and services

- CVP analysis is concerned with how profit is affected by changes in cost and selling price

- Profit/Volume ratio (P/V Ratio) represents the CVP analysis

- PV ratio is the ratio of contribution to sales

- The higher the P/V ratio that means a company is incurring huge profit

CVP Analysis

- CVP analysis has following assumptions
 - Sales price per unit is constant
 - Variable costs per unit are constant
 - Total fixed costs are constant
 - Everything produced is sold

CVP Analysis

$$\text{P/V Ratio (\%)} = \frac{\text{Contribution}}{\text{Sales}} * 100$$

OR

$$\text{P/V Ratio (\%)} = 1 - (\text{Variable Cost/Sales}) * 100$$

OR

$$\text{P/V Ratio} = \text{Sales} - \text{Variable Cost}$$

Ex :

Sales	10000
- VC	<u>2000</u>
Contribution	8000
- FC	<u>3000</u>
EBIT	5000

$$\text{P/V Ratio (\%)} = \frac{\text{Contribution}}{\text{Sales}} * 100 = \frac{8000}{10000} * 100 = 80\%$$

OR

$$\text{P/V Ratio (\%)} = 1 - (\text{Variable Cost/Sales}) * 100 = 1 - (2000/10000) * 100 = (1 - (0.2)) * 100 = 80\%$$

That means contribution in sales is 80% and the ratio of variable cost in sales is 20%

Margin of Safety

- It is a difference between actual sales volume and sales volume at BEP
- At BEP the MOS is Zero.
- If the actual sales $>$ BEP sales = Profit
- If the actual sales $<$ BEP sales = Loss
- $MOS = Total\ Sales - Break\ Even\ sales$

- A Company has supplied following information
 - Unit Sold = 20000
 - Total Sales = Rs. 60000
 - Total variable cost= 50% of Sales
 - Total Fixed Cost = Rs.18000
 - Calculate
 - Contribution per unit
 - P/V Ratio
 - BEP
 - Volume of sales to earn a profit Rs.25000

Sales	=	60000 (Per Unit SP = 3)
- VC	=	<u>30000</u>
Contribution		30000
- FC	=	<u>18000</u>
EBIT	=	12000

1. Contribution per unit = Selling Price per unit – Variable cost per unit
 $= 3 - 1.5 = 1.5$ per unit

2. PV Ratio = $\frac{\text{Contribution per unit}}{\text{Selling price per unit}} = \frac{1.5}{3} * 100 = 50\%$

3. BEP in units = $\text{FC} / (\text{SP per unit} - \text{VC per unit})$
 $= 18000 / (3 - 1.5) = 12000$ units

BEP in Rs. = $12000 * 3 = 36000$

OR

BEP in Rs. = $\text{FC} / \text{PV Ratio}$

4. Profit = (Sales * PV Ratio) – Fixed Cost

$25000 = (\text{Sales} * 0.5) - 18000$

$\frac{25000 + 18000}{0.5} = \text{Sales}$

0.5

Sales Amt = $86000 / 3 = 28667$ units

Example

- From the following information calculate
 - PV Ratio
 - BEP
 - MOS

Sales = 100000

Fixed Cost = 30000

Profit = 20000

- **A table fan manufacturing organization has the capacity to produce 500 fans p.a. The marginal cost of each fan is Rs. 200 and each fan is sold for Rs.250, while the fixed cost are Rs. 12000 p.a.**
 1. Calculate the BEP for output and sales.
 2. Calculate P/V ratio
 3. What would be the profit if the production of output is 90%

<p>1. BEP in Units = FC/SP per unit-VC per unit OR BEP In Units = FC / Contribution per Unit = 12000/ 50 = 240 units</p>	<p>1. BEP in Rs. = BEP units * Selling Price per Unit = 240 * 250 = 60000 Rs</p> <p>OR</p> <p>BEP = Total Fixed Cost/PV Ratio = 12000/20% = 60000 Rs.</p> <p>OR</p> <p>BEP = [FC/{1-(VC per unit/SP per unit)}]</p> <p>OR</p> <p>BEP = (FC* SP per unit)/Contribution per Unit</p> <p>OR</p> <p>BEP = (FC * Total Sales) / Total Contribution</p>
<p>2. P/V Ratio = Contribution/Sales = 50/250 = 20%</p>	

3. What would be the profit if the production of output is 90%
 Capacity = 500 fans
 90% capacity = 450 fans
 Since Fixed cost are fully recovered at BEP, the entire contribution beyond the BEP would be profit. So, profit on 450 units is
 Profit = (450 – 240) * 50 = 10500 Rs.

Example : From the following data calculate

1. P/V Ratio
2. Profit when sales is 2,00,000
3. Fixed Expense = 40000 Rs.
4. BEP = 100000 Rs

1. PV Ratio

$$\text{BEP} = \text{FC} / \text{PV Ratio} * 100$$

So,

$$\begin{aligned} \text{PV Ratio} &= \text{FC} / \text{BEP} * 100 \\ &= 40000 / 100000 \\ &= 40\% \end{aligned}$$

2. Profit when sales is 2,00,000

PV Ratio is the contribution ratio of sales
Which is 40%

$$\text{Sales} = 200000 \text{ (given)}$$

$$-\text{VC} = \underline{120000}$$

$$\text{Contribution} = 80000 \text{ (PV Ratio over sales)}$$

$$-\text{FC} = \underline{40000} \text{ (given)}$$

$$-\text{Profit} = 40000$$

$$\begin{aligned} \text{Profit} &= (\text{Sales} * \text{PV Ratio}) - \text{FC} \\ &= (200000 * 40\%) - 40000 \\ &= 40000 \text{ Rs.} \end{aligned}$$

- Pepsi Company produces a single article. Following cost data is given about its product:-
- Selling price per unit Rs.40
- Marginal cost per unit Rs.24
- Fixed cost per annum Rs. 16000

Calculate:

(a) P/V ratio

(b) break even sales

(c) sales to earn a profit of Rs. 2,000

(d) Profit at sales of Rs. 60,000

(e) New break even sales, if price is reduced by 10%.

- **Answers**

(a) P/V ratio = 40%

(b) break even sales = 40000

(c) sales to earn a profit of Rs. 2,000 = 1125 units

(d) Profit at sales of Rs. 60,000 = 8000

(e) New break even sales, if price is reduced by 10%. = 48000

- Calculate
 - BEP expressed in amount of sales in Rs
 - How many units must be sold to earn net income of 20% of sales
 - Selling Price = Rs.200 per unit
 - Variable cost = Rs. 120 per unit
 - Fixed cost = Rs. 24,00,000

- $BEP = FC/SP \text{ per unit} - VC \text{ per unit}$
 $= 2400000/80 = 30,000 \text{ units}$
 $BEP \text{ in Rs.} = 30000 * 200 = 60,00,000$

- Let the unit sold = X

Sales =		200X
- VC	=	<u>120X</u>
Contribution	=	80 X
- FC	=	<u>2400000</u>
Profit	=	40X

Total sales = Cost + Profit

$$200X = 120X + 24,00,000 + 40X$$

$$200X - 160X = 24,00,000$$

$$40X = 24,00,000$$

$$X = 60,000$$

- Pepsi Company produces a single article. Following cost data is given about its product:-
- Selling price per unit Rs.40
- Marginal cost per unit Rs.24
- Fixed cost per annum Rs. 16000

Calculate:

(a) P/V ratio

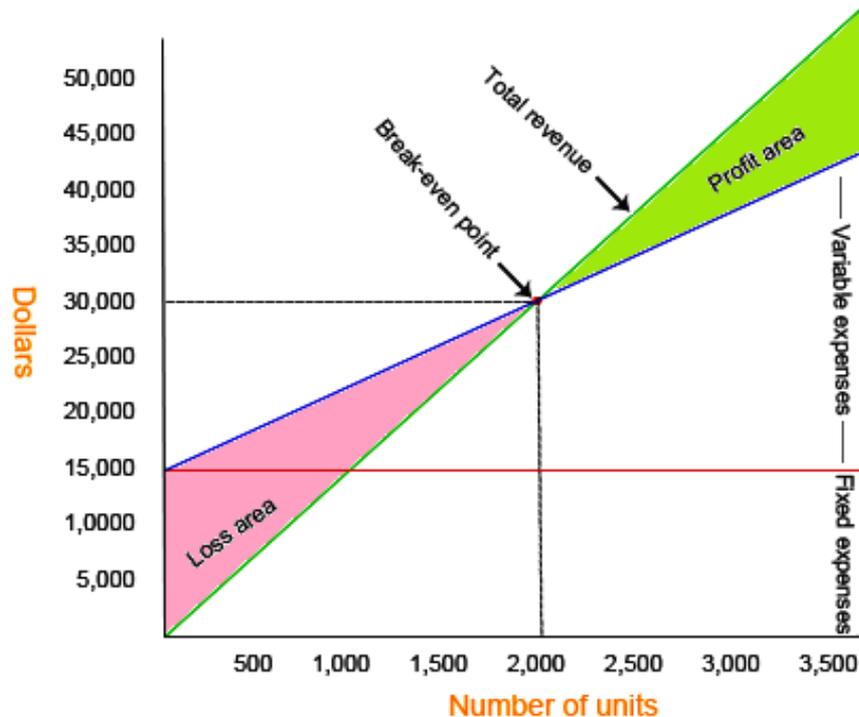
(b) break even sales

(c) sales to earn a profit of Rs. 2,000

(d) Profit at sales of Rs. 60,000

(e) New break even sales, if price is reduced by 10%.

- Calculate break-even point from the following data:
- Fixed Cost = Rs 2,50,000
- Variable Cost = Rs 15 per unit
- Selling Price = Rs 25 per unit
- Production level in units 12,000, 15,000, 20,000, 25,000, 30,000, and 40,000.



•Explanation of the graph:

X – axis = No. of Units

Y – axis = Dollars

The straight line in red color represents the total annual fixed expenses of \$15,000.

The blue line represents the total expenses. Notice that the line has a positive or upward slop that indicates the effect of increasing variable expenses with the increase in production.

The green line with positive or upward slop indicates that every unit sold increases the total sales revenue.

The total revenue line and the total expenses line cross each other. The point at which they cross each other is the *break-even point*.

Notice that the total expenses line is above the total revenue line before the point of intersection and below after the point of intersection. It tells us that the business suffers a loss before the point of intersection and makes a profit after this point.

