Exercise 3.1 CVP analysis

ABC firm manufactures product X. The following information are available for the last year, 2022.

1/1-31/12/2022

		(€)	(€)	(€)
	Sales revenues (100.000 units × €10)			1,000,000
Less:	Manufacturing Expenses			
	Direct materials	200,000		
	Direct labor	300,000		
	Variable OH	60,000		
	Fixed OH	180,000	740,000	
Less:	SGA Expenses			
	Variable SGA Expenses	40,000		
	Fixed SGA Expenses	120,000	160,000	900,000
	Operating Income			**100,000**

Required:

1. Calculate the contribution margin per unit and the break-even point quantity. Verify the profit presented in the P/L statement above.
2. Market research indicates that changing the design of X will boost sales. The new selling price will be €12.5 while the variable cost will increase by €1.50 per unit. Assuming that the rest data remain the same which is the necessary sales volume to give a profit of €200,000?

Solution

1.

Selling price		10
Variable cost		
Direct materials	2	
Direct labor	3	
Variable OH	0.6	
Variable SGA	0.4	-6
Contribution margin		**4**
Fixed Cost		
Fixed OH	180,000	
Fixed SGA	120,000	300,000
BEP quantity		**75,000**

Profit verification

Excess quantity	25,000
×CM	4
profit	**100,000**

2.

Selling price	12.5
Variable cost	-7.5
Contribution margin	5
Fixed Cost	300,000
Required profit	200,000
Total	500,000
Required volume	100,000

Exercise 3.2 Special order

ABC firm produces the product X with the following data:

Normal price (€)	50
Annual volume (units)	2.500
Manufacturing cost:	
Variable per unit (€)	20
Fixed (annual) (€)	75.000
SGA Expenses	
Variable per unit (sales commissions) (€)	6
Fixed (annual) (€)	15.000

The firm receives a special order for 500 units. The price that the customer is willing to pay is €45. The manufacturing variable cost will be unchanged while sales commissions will be lower by 1/3. Fixed cost will be the same. The normal production level will not be affected because the firm has excess capacity

Required

1. Should the firm accept the special order?
2. How would you change your answer if the firm operates at full capacity?

Solution

1. No opportunity cost	**Acceptance**	**Not Acceptance**	**Differential**
Sales revenues (500*45)	22.500	0	22.500 F
Manufacturing VC (500*20)	10.000	0	10.000 U
SGA VC (500*4)	2.000	0	2.000 U
Contribution margin	10.500	0	10.500 F

2. With opportunity cost	**Acceptance**	**Not Acceptance**	**Differential**
Sales revenues (500*45;500*50)	22.500	25.000	-2.500 U
Manufacturing VC (500*20)	10.000	10.000	0
SGA VC (500*4; 500*6)	2.000	3.000	-1.000 F
Contribution margin	10.500	12.000	-1.500 U

Το περιθώριο συνεισφοράς στη μη αποδοχή είναι το κόστος ευκαιρίας σε περίπτωση αποδοχής.

Exercise 3.3 Production mix

ABC firm manufactures 3 types of products, X, Y, and Z. ABC has a constrain in machine hours, that is, available machine hours per week is 148. The following data is also available:

Product type	X	Y	Z
Selling price/unit (€)	50	40	46
Variable cost (€)	20	16	24
Weekly demand	25	20	30
Required machine hours	4	3	4

Required: Determine the efficient production mix.

Solution

	Product type	X	Y	Z
	Selling price	50	40	46
Μείον:	Variable cost	-20	-16	-24
	Contribution Margin	30	24	22
	Required machine hours per unit	4	3	4
	CM/Machine hour	7,5	8	5,5
	Ranking	2nd	1st	3rd

Weekly demand	25	20	30
Production mix	Demand	Machine hours per unit	Total machine hours
Y	20	3	60
X	*22*	4	88
			148

Exercise 3.4 Product mix

A company manufactures three products, X, Y and Z. The sales demand and the standard unit selling prices and costs for the next accounting period, period 1, are estimated as follows:

	X	Y	Z
Maximum demand (000 units)	4.0 $ per unit	5.5 $ per unit	7.0 $ per unit
Selling price	28	22	30
Variable costs:			
Raw materials ($1 per kg)	5	4	6
Direct labour ($12 per hour)	12	9	18

Required:

1. Determine the limiting factor, If supplies in period 1 are restricted to 90 000 kg of raw material and 18 000 hours of direct labour.
2. In period 2 the company will have a shortage of raw materials, but no other resources will be restricted. The standard selling prices and costs and the level of demand will remain unchanged. In what order should the materials be allocated to the products if the company wants to maximize profit?

Suggested Solution:

1.

	X	Y	Z	Total
Demand (units)	4 000	5 500	7 000	
Materials (kg)	20 000	22 000	42 000	84 000
Labour (hours)	4 000	4 125	10 500	18 625

Labour is the limiting factor.

2.

	X	Y	Z
	$	$	$
Selling price	28	22	30
Variable cost	17	13	24
Contribution	11	9	6
kg	5	4	6
Contribution per kg ($)	2.20	2.25	1
Ranking	2	1	3

Exercise 3.2 Terminating activity

ABC is a merchandise firm. The firm has 3 departments, department A, B and C. The department C presents operating loss and the firm considers its termination. The following information is available for the departments:

		Departments		
		Department A	**Department B**	**Department C**
	Sales Revenue	254.000	183.000	97.000
Less:	Expenses	-213.000	-163.000	-106.000
	Profit (Loss)	41.000	20.000	-9.000

The fixed cost of the firm equals €138,000 and is allocated equally across the departments. The fixed cost composition is as follows:

Fixed Cost	
Rent expenses	40.000
Depreciation	60.000
Administration Expenses	20.000
Advertising Expenses	18.000
Total	138.000

If the department C is terminated, ABC estimates that the fixed administration expenses will decrease by 20% while the fixed advertising expenses will decrease by 10%.
Required: Should ABC terminate the department C?

Solution

Fixed cost per department	138.000	3	46000
Therefore, the variable cost for C is = 106.000-46.000 = €60.000			
FC decrease			
Administration	20.000	20%	4000
Advertising	18.000	10%	1.800
Total			5.800

Traceable FC = €5.800. Common FC = 46.000 – 5.800 = €40.200.

	Termination	**Retaining**	**Differential**
Sales Revenues	0	97.000	-97.000 U
Variable cost	0	60.000	-60.000 F
Contribution margin	0	37.000	-37.000 U
Fixed Cost	40.200	46.000	-5.800 F
Profit/loss	-40.200	-9.000	-31.200 U

Therefore the department should be retained.

Exercise 3.5 Terminating activity

A company has three shops (R, S and T) to which the following budgeted information relates:

	Shop R	Shop S	Shop T	Total
	£000	£000	£000	£000
Sales	400	500	600	1500
Contribution	100	60	120	280
Less: Fixed costs	(60)	(70)	(70)	(200)
Profit/loss	40	(10)	50	80

Sixty per cent of the total fixed costs are general company overheads. These are apportioned to the shops on the basis of sales value. The other fixed costs are specific to each shop and are avoidable if the shop closes down.

Required:

1. If shop S closed down and the sales of the other two shops remained unchanged, what would be the revised budgeted profit for the company?

Suggested Solution:

Apportioned fixed costs = £120 000 (0.6 x £200 000)
Fixed costs apportioned to Shop S = £40 000 (500/1 500 x £120 000)
Specific avoidable fixed cost for Shop S = £30 000 (£70 000 - £40 000)
Shop S therefore provides a contribution of £30 000 (variable cost contribution of £60 000 less specific fixed costs of £30 000) to general apportioned fixed costs. The effect of closing down shop S is that total budgeted profit will decline by the lost contribution from S to £50 000.