

3-36 CVP, shoe stores.

1. Because the unit sales level at the point of indifference would be the same for each plan, the revenue would be equal. Therefore, the unit sales level sought would be that which produces the same total costs for each plan.

$$\begin{aligned} \text{Let } Q &= \text{unit sales level} \\ \$19.50Q + \$360,000 + \$81,000 &= \$21.00Q + \$360,000 \\ \$81,000 &= \$1.5Q \\ Q &= 54,000 \text{ units} \end{aligned}$$

2	Commission Plan		Salary Plan	
Sales in units	50,000	60,000	50,000	60,000
Revenues @ 30	1,500,000	1,800,000	1,500,000	1,800,000
Variable costs				
@\$21.00 & @19.50	1,050,000	1,260,000	975,000	1,170,000
Contribution margin	450,000	540,000	525,000	630,000
Fixed costs	360,000	360,000	441,000	441,000
Operating income	90,000	180,000	84,000	189,000

The decision regarding the plans will heavily depend on the unit sales level that is generated by the fixed salary plan. For example, as part (1) shows, at identical unit sales levels in excess of 54,000 units, the fixed salary plan will always provide a more profitable final result than the commission plan.

3. Let TQ = Target number of units

$$\begin{aligned} \text{a. } \$30.00 \text{ TQ} - \$19.50 \text{ TQ} - \$441,000 &= \$168,000 \\ \$10.5 \text{ TQ} &= \$609,000 \\ \text{TQ} &= 58,000 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{b. } \$30.00 \text{ TQ} - \$21.00 \text{ TQ} - \$360,000 &= \$168,000 \\ \$9.00 \text{ TQ} &= \$528,000 \\ \text{TQ} &= 58,667 \text{ units (rounded)} \end{aligned}$$

The decision regarding the salary plan heavily depends on predictions of demand. For instance, the salary plan offers the same operating income at 58,000 units as the commission plan offers at 58,667 units.

3-37 Sensitivity and inflation (continuation of 3-36)

1. Revenues, \$30*48,000	1,440,000	
\$18*2,000	36,000	1,476,000
Variable costs:		
Goods sold \$19.50 *50,000	975,000	
Commission, 5%*\$1,476,000	73,800	1,048,800
Contribution margin		427,200
Fixed costs		360,000
Operating income		67,200

Another alternative approach is:

Contribution margin on 48,000 pairs * \$9.00	432,000
Deduct negative contribution margin on unsold paris 2,000*[\$18.00-(\$19.50+\$0.9* commission)]	4,800
Contriution margin	427,200
Fixed costs	360,000
Operating income	67,200

* 5% of \$18.00 = \$0.90

- Optimal operating income, given perfect knowledge, would be the \$432,000 contribution computed above, minus \$360,000 fixed costs, or \$72,000.
- The point of indifference is where the operating incomes are equal. Let X = unit cost per pair that would produce the identical operating income of \$67,200. Then:

$$48,000 \{ \$30.00 - (X + \$1.50) \} - 360,000 = \$67,200$$

$$48,000 (\$28.50 - X) - \$360,000 = \$67,200$$

$$\$1,368,000 - 48,000 X - \$360,000 = \$67,200$$

$$48,000 X = \$940,800$$

$$X = \$19.60$$

Therefore, any rise in purchase cost in excess of \$19.60 per pair increases the operating income benefit of signing the long-term contract.

In a short-cut solution, you could take the \$4,800 difference between the "ideal" operating income (of \$72,000) at the current cost perpair and the operating income under the contract (of \$67,200) and divide it by 48,000 units to get 10 cents per pair difference.

Revenue mix, three products

- Operating income = 80,000* \$2.00 + 100,000 * \$3.00 + 20,000 * \$6.00 - \$406,000
 Operating income = \$160,000 + \$300,000 + \$120,000 - \$406,000
 Operating income = \$174,000

Let K = Number of units of Product K to break even

5K = Number of units of Product J to break even

4K = Number of units of Product H to break even

Revenues - Variable costs - Fixed costs = Zero operating income

Contriubtion margin - Fixed costs = 0

$\$2 * 4K + \$3 * 5K + 6K - \$406,000 = 0$

$\$29K = \$406,000$

$K = 14,000$ units of K

$5K = 70,000$ units of J

$4K = 56,000$ units of H

Total = 140,000 unitss

The break-even point is 14,000 K, 70,000 J and 56,000 H , a grand total of 140,000 units.

2. Operating income would rise, because the higher-margin goods (K) would be substituting for lower-margin goods (J) in the sales mix:

$$\text{Operating income} = 80,000 * \$2 + 80,000 * \$3 + 40,000 * \$6 - \$406,000$$

$$\text{Operating income} = \$160,000 + \$240,000 + \$240,000 - \$406,000$$

$$\text{Operating income} = \$234,000$$

Let K = Number of units of Product K to break even

2K = Number of units of J and H to break even

$$\$2 * 2K + \$3 * 2K + \$6K - \$406,000 = 0$$

$$\$16K = \$406,000$$

$$K = 25,375 \text{ units of K}$$

$$2K = 50,750 \text{ units of J}$$

$$2K = 50,750 \text{ units of H}$$

$$\text{Total} = 126,875 \text{ units}$$

The breakeven point of 140,000 units would decrease to 25,375 K, 50,750 J and 50,750 H, a grand total of 126,875 units.