Assignment to 6.2.4.1
- Solution -

Data

$p = 169$ Price per stay

$x = 1800$ Average number of stays per month

$p \cdot x = 304200$ Monthly turnover

$C = 300000$ Total cost per month

$p \cdot x - C = 4200$ Profit per month

1.1 Full cost per stay

$$c = \frac{C}{x}$$

$c = 166.67$ Full cost per stay

$p_Z = 100$ Price per stay offered

$\text{Decision}(c, p_Z) = \text{if}(p_Z > c, \text{"yes"}, \text{"no"})$

$\text{Decision}(c, p_Z) = \text{"no"}$

1.2 Variable cost per stay

$Cf = 264000$ Fixed cost per month

$Cv = 36000$ Variable cost per month

$$cv = \frac{Cv}{x}$$ Variable cost per stay

$cv = 20$

$\text{Decision}(p_Z, cv) = \text{if}(p_Z > cv, \text{"yes"}, \text{"no"})$

$\text{Decision}(p_Z, cv) = \text{"yes"}$

$cm_Z = p_Z - cv$ Offered contribution margin per stay

$cm_Z = 80$

$\text{Decision}(cm_Z) = \text{if}(cm_Z > 0, \text{"yes"}, \text{"no"})$

$\text{Decision}(cm_Z) = \text{"yes"}$

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2. Break-even quantity

If turnover covers all fixed and variable cost, profit is = 0 and break-even quantity is reached.

For a specific product profit can be defined as follows:

$$R = p \cdot x - cv \cdot x - Cf$$

From this follows:

$$x = \frac{R + Cf}{p - cv}$$

The variable elements of profit are combined to the contribution margin:

$cm = p - cv$ Contribution margin per stay if the offer is rejected

$cm = 149$

If profit = 0, x is the break-even quantity:

$$x_{BE} = \frac{Cf}{cm}$$ Break-even quantity

$x_{BE} = 1771.81$

$S_{BE} = p \cdot x_{BE}$ Turnover at break-even quantity

$S_{BE} = 299436.24$

3. Short run minimum price

If a room is rented just at its variable cost, the rise in cost will equate the additional turnover. Thus the profit does not change. If the additional turnover is higher than the increase in cost, there will be a profit, otherwise a loss. So additional sales must be priced at their variable cost as a basic minimum requirement. If so, no contribution margin is added. The additional contribution margin is zero.

4. Why is it a short run minimum price?

The so called short run minimum price should better be named *selective* minimum price, because the problems come if this minimum price is granted to *all* customers: If so, there is a loss amounting to the fixed cost:

$$R = (cv - cv) \cdot x - Cf$$

$R = -264000$

5. Long run minimum price

In the long run, not only the variable cost must be covered, but the fixed cost must be covered, too. For this reason the short run minimum price cannot be granted to all customers. In the average, the price of a product must cover its average variable cost and its average fixed cost. So the full cost per stay of question 1.1 is the long run minimum price. With this price the profit is zero.

If however the price is reduced it may happen and confidently it will happen that there is an increase in demand, which will change the average cost. In order to determine the price under these circumstances, the demand curve must be known.

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6. Additional profit 1

If in the starting position the quantity x_0 is produced and sold, the profit is:

$$R_0 = cm \cdot x_0 - Cf$$

With constant selling prices and constant variable costs per unit the quantity x_1 yields:

$$R_1 = cm \cdot x_1 - Cf$$

Equating

$$\Delta R = R_1 - R_0$$

and

$$\Delta x = x_1 - x_0$$

yields:

$$\Delta R = cm \cdot \Delta x$$

$$\Delta x = \frac{\Delta R}{cm}$$ Difference in quantity required for a requested increase in profit. This quantity is a break-even quantity for additional profit.

$$\Delta R = 50000$$

$$\Delta x = \frac{\Delta R}{cm}$$

$$\Delta x = 335.57$$

7. Additional profit 2

$p_n = 144$ New selling price

$cm_n = p_n - cv$ New contribution margin

$cm_n = 124$

If the price is reduced for all guests the break-even quantity must be calculated from the onset, beacause the previous profit was based on the old price, and now it will sink. So it is not possible just to calculate the additional quantity as was done in question 6.

The new profit must be in total:

$$R = p \cdot x - cv \cdot x - Cf + \Delta R$$

$$R = 54200$$

For this result a new break-even quantity must be determined, namely:

$x_n = \frac{R + Cf}{cm_n}$ New break-even quantity

$x_n = 2566.13$

$x_n - x = 766.13$ Additional stays necessary to reach requested profit

8. Break-even quantity for Brad Pitt

To compensate the company for Brad's fee, the wedding couples must increase the profit by this amount. So we have:

$\Delta R = 20000$ Additional profit required

In addition we have:

$p = 666$

$cv = 180$

$cm = p - cv$

$cm = 486$

$\Delta x = \frac{\Delta R}{cm}$

$\Delta x = 41.15$ Break-even quantity for Brad's fee