CHAPTER 5
STRATEGIC CAPACITY PLANNING
FOR PRODUCTS AND SERVICES

Solutions

1. a. \( Utilization = \frac{Actual \ output}{Design \ capacity} = \frac{7}{10} = 70\% \)

\( Efficiency = \frac{Actual \ output}{Effective \ capacity} = \frac{7}{8} = 87.5\% \)

b. \( Utilization = \frac{Actual \ output}{Design \ capacity} = \frac{4}{6} = 67\% \)

\( Efficiency = \frac{Actual \ output}{Effective \ capacity} = \frac{4}{5} = 80\% \)

c. This is not necessarily true. If the design capacity is relatively high, the utilization could be low even though the efficiency was high.

3. FC = $9,200/month
VC = $.70/unit
Rev = $.90/unit

a. \( Q_{BEP} = \frac{FC}{Rev - VC} = \frac{$9,200}{$.90 - .70} = 46,000 \) units

b. Profit = Rev x Q – (FC + VC x Q)

1. \( P_{61,000} = $.90(61,000) - [$.9200 + $.70(61,000)] = $3,000 \)

2. \( P_{87,000} = $.90(87,000) - [$.9200 + $.70(87,000)] = $8,200 \)

c. \( Q = \frac{Specified \ profit + FC}{Rev - VC} = \frac{$16,000 + 9,200/\text{month}}{$.90/\text{unit} - $.70/\text{unit}} = 126,000 \) units.

d. Total Revenue = Rev x Q, so \( Q = \frac{Total \ Revenue}{R} = \frac{$23,000}{$.90/\text{unit}} = 25,556 \) units.
4. FC | Rev | VC  
---|---|---
A: $40,000 | $15/unit | $10/unit  
B: $30,000 | $15/unit | $11/unit  

a. \( Q_{BEP} = \frac{FC}{Rev - VC} \)

\[ Q_{BEP,A} = \frac{40,000}{15 - 10} = 8,000 \text{ units} \]

\[ Q_{BEP,B} = \frac{30,000}{15 - 11} = 7,500 \text{ units} \]

b. Profit = \( Q(Rev - VC) - FC \)

\[ \text{[A’s Profit]} = Q(15 - 10) - 40,000 = Q(16 - 12) - 30,000 \]

Solving, \( Q = 10,000 \text{ units} \)

c. \( P_A = 12,000(15 - 10) - 40,000 = 20,000 \text{ [A is higher]} \)

\( P_B = 12,000(16 - 12) - 30,000 = 18,000 \)

12. \( R = 5.95, VC = 3 \). One line would have a fixed cost of $20 (6,000 ÷ 300) per hour and two lines would have a fixed cost of $35 (10,500 ÷ 300) per hour.

<table>
<thead>
<tr>
<th>Volume</th>
<th>No. of lines</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>1</td>
<td>$21.30 = 14 (5.95 – 3) – 20</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>$24.25 = 15 (5.95 – 3) – 20</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>$12.20 = 16 (5.95 – 3) – 35</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>$15.15 = 17 (5.95 – 3) – 35</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>$18.10 = 18 (5.95 – 3) – 35</td>
</tr>
</tbody>
</table>

Choose one line. Assumption: Little or negligible cost of manufacturing.