1. [Utilization and the Efficiency] Ch 5 – Page 212 – Problem 1

Determine the utilization and the efficiency for each of these situations:

a. A loan processing operation that processes an average of 7 loans per day. The operation has a design capacity of 10 loans per day and an effective capacity of 8 loans per day.

b. A furnace repair team that services an average of four furnaces a day if the design capacity is six furnaces a day and the effective capacity is five furnaces a day.

c. Would you say that systems that have higher efficiency ratios than other systems will always have higher utilization ratios than those other systems? Explain.

\[
\text{Utilization} = \frac{\text{output}}{\text{design capacity}} = \frac{17}{10} \times 100\% \\
\text{Efficiency} = \frac{\text{output}}{\text{effective capacity}} = \frac{7}{8} \\
\text{Utilization} = \frac{4}{6} \\
\text{Efficiency} = \frac{4}{5} \\
\text{U} = \frac{1000}{2000} \\
\text{L} = \frac{1000}{1000} \\
\]

2. [Capacity Planning] Ch 5 – Page 212 – Problem 3

A producer of pottery is considering the addition of a new plant to absorb the backlog of demand that now exists. The primary location being considered will have fixed costs of $9,200 per month and variable costs of 70 cents per unit produced. Each item is sold to retailers at a price that averages 90 cents.

a. What volume per month is required in order to break even?

b. What profit would be realized on a monthly volume of 61,000 units? 87,000 units?

c. What volume is needed to obtain a profit of $16,000 per month?

d. What volume is needed to provide a revenue of $23,000 per month?

What are given in the problem description?

\[
\begin{align*}
\text{Profit} &= \text{Total Revenue} - \text{Total Cost} \\
\text{TR} &= \text{Q} \cdot P \\
\text{TC} &= \text{FC} + \text{Q} \cdot VC \\
\text{Q} \cdot 90 &= 9200 + \text{Q} \cdot 0.7 \\
\text{U} &= \frac{\text{TR}}{\text{Q} \cdot 90} = \frac{\text{FC} + \text{Q} \cdot \text{VC}}{\text{Q} \cdot 90} \\
\text{CB} &= 46000 \text{ units} \\
\end{align*}
\]
What do we mean "break even"?

\[ Q \cdot 90 = 7200 + Q \cdot 10 \]
\[ Q = 4600 \text{ units} \]

\[ 6100 \cdot 0.2 - 9200 = 2000 \]
\[ 8700 \cdot 0.2 - 9200 = 8200 \]


The following table lists the components needed to assemble an end item, lead times, and quantities on hand.

<table>
<thead>
<tr>
<th>Item</th>
<th>End</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT (wk)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Amount on hand</td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>25</td>
<td>12</td>
<td>30</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

End Item

\[ 20 \times 2 = 40 \]

B \(-20 \times 2 = 40 \)
\(-10 \)
\[ 30 \times 2 = 60 \text{ pieces} \]

C \(-20 \times 1 = 20 \)
\(-10 \)
\[ 10 \times 2 = 20 \]

D \(-20 \times 3 = 60 \)
\(-25 \)
\[ 35 \times 2 = 70 \]
\[ 150 \]

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