Chapter 1

Operations as a Competitive Weapon

Discussion Questions

1. Some responsibilities generally supported will include responsibilities to stockholders, to customers, to the environment, to provide safe working conditions, and to pay taxes. More debatable are responsibilities to provide medical care, maternity leave, child care, retirement, minimum wages and responsibilities to the community other than paying taxes.
2. The problems of unions faced with international competition is mentioned in the Caterpillar video. As this is written, NAFTA and GATT are in the news. It is hoped that some of the issues will still be remembered at the time this is published. Will lifting trade barriers expose American workers to competition from workers in undeveloped economies? Or will increased opportunity to compete result in more exports and more jobs? With decreased tariffs will multinationals move operations elsewhere to escape unions and environmental regulations? It is hoped that students will recognize that effective operations management is the key to favorable outcomes.

Problems

1. Boehring University.

a. Productivity has increased by 28% compared to Solved Problem 1 (productivity = 1.00).
Value of output:

$$60\frac{\text{students}}{\text{class}}\times 3\frac{\text{credit - hours}}{\text{student}}\times\left(\frac{\$150\text{ tuition}+\$150\text{ state support}}{\text{credit - hour}}\right)=\$54{,}000/\text{class}$$

Value of input: labor + material + overhead

$$\frac{\$6000+\left(\frac{\$20}{\text{student}}\times 60\text{ students}\right)+\$35{,}000}{\text{class}}=\$42{,}200/\text{class}$$

Productivity ratio:

$$\text{Productivity}=\frac{\text{Output}}{\text{Input}}=\frac{\$54{,}000}{\$42{,}200}=1.28$$

b. Labor productivity has increased about 26% compared to Solved Problem 1.

Value of output is the same as in part a: $\$54{,}000/\text{class}$

Labor-hours of input:

$$20\frac{\text{hours}}{\text{week}}\times 16\frac{\text{weeks}}{\text{class}}=320\,\text{hours}/\text{class}$$

Productivity ratio:

$$\text{Labor Productivity}=\frac{\text{Output}}{\text{Labor Input}}=\frac{\$54{,}000}{320\text{ hours}}=\$168.75/\text{hour}$$

The $192 season ticket price is not used in this calculation. It is a “red herring.”

2. Natalie Attired.

a. Labor productivity

Value of output is:

$$\left(8 \text{ defectives} \times \$90/\text{defective}\right) + \left(120 \text{ garments} \times \$200/\text{garment}\right) = \$24,720$$

Labor-hours of input is given: 360 hours

$$\text{Labor Productivity} = \frac{\text{Output}}{\text{Labor Input}} = \frac{\$24,720}{360 \text{ hours}} = \$68.67/\text{hour}$$

b. Value of output increased by ($24,720 – $20,680) = $4,040.
Cost of materials decreased by $(132 \times 128) \times \$70$ = $ 280.
Total value of improvements = $4,320.

Under the terms of gain sharing, half ($2,160) is available for sharing. The workers worked a total of 360 hours, so on an hourly basis the quality bonus is:

$$\$2160/360 \text{ hours} = \$6.00/\text{hour}$$

3. Suds and Duds Laundry.

Output per person does not vary much whether it is Sud, Dud or Jud working. Productivity declines when all three are present. Perhaps there isn't enough work to keep three persons occupied, or perhaps there is not enough work space or equipment to accommodate three workers.

Week	Number of Workers	Input (Labor-hours)	Output (Shirts)	Output/Input Ratio:
1	2	24	68	2.83 shirts/hour
2	2	46	130	2.83 shirts/hour
3	3	62	152	2.45 shirts/hour
4	3	51	125	2.45 shirts/hour
5	2	45	131	2.91 shirts/hour

4. Compact disc players.

Value of Output: $250
Value of Input: Labor + Materials + Overhead

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}} = \frac{\$250}{\$20 + \$65 + \$40} = 2.000$$

10% productivity improvement => 2.00 x 1.10 = 2.200

Given productivity = 2.20, and the value of output = $250, we solve for the cost of inputs:

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}} = \frac{\$250}{\text{Input}} = 2.20$$

$$\text{Input} = \frac{\$250}{2.2} = \$113.64 \text{ or } \$114$$

The cost of inputs must decrease by ($125 – $114) = $11.

a. An $11 reduction in material costs is $11/$65 = 16.92%

b. An $11 reduction in labor costs is $11/$20 = 55.00%

c. An $11 reduction in overhead costs is $11/$40 = 27.50%

5. Big Black Bird Company.

The Big Black Bird Company problem is based on a product made by Raven Industries. None of the numbers are representative of actual costs or volume.

a. Productivity

Original situation:
Value of output:

$$(2500 \text{ uniforms} \times \$200) = \$500{,}000$$

Value of input:

$$(2500 \text{ uniforms} \times \$120) = \$300{,}000$$

Productivity ratio:

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}} = \frac{\$500{,}000}{\$300{,}000} = 1.67$$

Overtime situation:

Value of output:

$$(4000 \text{ uniforms} \times \$200) = \$800{,}000$$

Value of input:

$$(4000 \text{ uniforms} \times \$144) = \$576{,}000$$

Productivity ratio:

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}} = \frac{\$800{,}000}{\$576{,}000} = 1.39$$

Productivity decreases by:

$$\frac{1.67 - 1.38}{1.67} \times 100\% = 17.37\%$$

b. Labor Productivity

Original situation:
Value of output (from part a) is: $500,000
Labor-hours of input:
(70 × 40 hours) + (30 × 40 hours) = 4000 hours
Labor productivity = $500,000/4000 hours = $125/hour

Overtime situation:
Value of output (from part a) is: $800,000
Labor-hours of input:
(70 × 72 hours) + (30 × 72 hours) = 7200 hours
Labor productivity = $800,000/7200 hours = $111/hour

Labor productivity decreases by:

$$\frac{125 - 111}{125} \times 100\% = 11.2\%$$

c. Gross Profits

Original situation: $500,000 – $300,000 = $200,000

Overtime situation: $800,000 – $576,000 = $224,000

Weekly profits increased.

Note: Wartime situations typically decrease productivity, and increase profitability.