



# part I

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# Productivity labor exercise

- Productivity can be measured in a variety of ways, such as by labor, capital, energy, material usage, and so on.
- At Modern Lumber, Inc., **Art Binley, president and producer of apple crates** sold to growers, has been able, with his current equipment, to produce 240 crates per 100 logs. He currently purchases 100 logs per day, and each log requires 3 labor-hours to process. He believes that he can hire a professional buyer who can buy a better-quality log at the same cost. If this is the case, he can increase his production to 260 crates per 100 logs. His labor-hours will increase by 8 hours per day.
- **What will be the impact on productivity (measured in crates per labor-hour) if the buyer is hired?**

# At stake

Hau Lee Furniture, Inc., spends 60% of its sales dollars in the supply chain and has a current gross profit of \$10,000. Hau wishes to increase gross profit by \$5,000 (50%). He would like to compare two strategies:

## **reducing material costs vs. increasing sales**

The current material costs and production costs are 60% and 20%, respectively, of sales dollars, with fixed cost at a constant \$10,000. Analysis indicates that an improvement in the supply chain that would reduce material costs by 8.3% ( $\$5,000/\$60,000$ ) would produce a 50% net profit gain for Hau, whereas a much larger 25% increase in sales ( $\$25,000/\$100,000$ ) would be required to produce the same result.

|                   | CURRENT SITUATION | SUPPLY CHAIN STRATEGY | SALES STRATEGY |
|-------------------|-------------------|-----------------------|----------------|
| Sales             | \$100,000         | \$100,000             | \$125,000      |
| Cost of materials | \$60,000 (60%)    | \$55,000 (55%)        | \$75,000 (60%) |
| Production costs  | \$20,000 (20%)    | \$20,000 (20%)        | \$25,000 (20%) |
| Fixed costs       | \$10,000 (10%)    | \$10,000 (10%)        | \$10,000 (8%)  |
| Profit            | \$10,000 (10%)    | \$15,000 (15%)        | \$15,000 (12%) |

# And PRODUCTIVITY....

- Art Binley has decided to look at his productivity from a multifactor (total factor productivity) perspective.
- To do so, he has determined his labor, capital, energy, and material usage and decided to use dollars as the common denominator.
- His total labor-hours are now 300 per day and will increase to 308 per day. His capital and energy costs will remain constant at \$350 and \$150 per day, respectively. Material costs for the 100 logs per day are \$1,000 and will remain the same. Because he pays an average of \$10 per hour (with fringes), Binley determines his productivity increase as follows ...

# Productivity Measures

## OM Explorer

### Tutor 1.1—Productivity Measures

The state ferry service charges \$18 per ticket plus a \$3 surcharge to fund planned equipment upgrades. It expects to sell 4,700 tickets during the eight-week summer season. During that period, the ferry service will experience \$110,000 in labor costs. Materials required for each passage sold (tickets, a tourist-information sheet, and the like) cost \$1.30. Overhead during the period comes to \$79,000.

- a. What is the multifactor productivity ratio?
- b. If ferry-support staff work an average of 310 person-hours per week for the 8 weeks of the summer season, what is the labor productivity ratio? Calculate labor productivity on an hourly basis.

Student tuition at Boehring University is \$100 per semester credit hour. The state supplements school revenue by matching student tuition dollar for dollar. Average class size for a typical three-credit course is 50 students. Labor costs are \$4,000 per class, materials costs are \$20 per student per class, and overhead costs are \$25,000 per class.

- a. What is the *multifactor* productivity ratio for this course process?
- b. If instructors work an average of 14 hours per week for 16 weeks for each three-credit class of 50 students, what is the *labor* productivity ratio?

Natalie Attired makes fashionable garments. During a particular week employees worked 360 hours to produce a batch of 132 garments, of which 52 were "seconds" (meaning that they were flawed). Seconds are sold for \$90 each at Attired's Factory Outlet Store. The remaining 80 garments are sold to retail distribution, at \$200 each. What is the *labor* productivity ratio of this manufacturing process?

## Sustainability

The design team developed the following revenue and cost information for the two speaker design alternatives:

### Harmonizer

| PART                  | RESALE REVENUE<br>PER UNIT | RECYCLING<br>REVENUE PER UNIT | PROCESSING<br>COST PER UNIT | DISPOSAL COST<br>PER UNIT |
|-----------------------|----------------------------|-------------------------------|-----------------------------|---------------------------|
| Printed circuit board | \$5.93                     | \$1.54                        | \$3.46                      | \$0.00                    |
| Laminate back         | 0.00                       | 0.00                          | 4.53                        | 1.74                      |
| Coil                  | 8.56                       | 5.65                          | 6.22                        | 0.00                      |
| Processor             | 9.17                       | 2.65                          | 3.12                        | 0.00                      |
| Frame                 | 0.00                       | 0.00                          | 2.02                        | 1.23                      |
| Aluminum case         | <u>11.83</u>               | <u>2.10</u>                   | <u>2.98</u>                 | <u>0.00</u>               |
| Total                 | \$35.49                    | \$11.94                       | \$22.33                     | \$2.97                    |

### Rocker

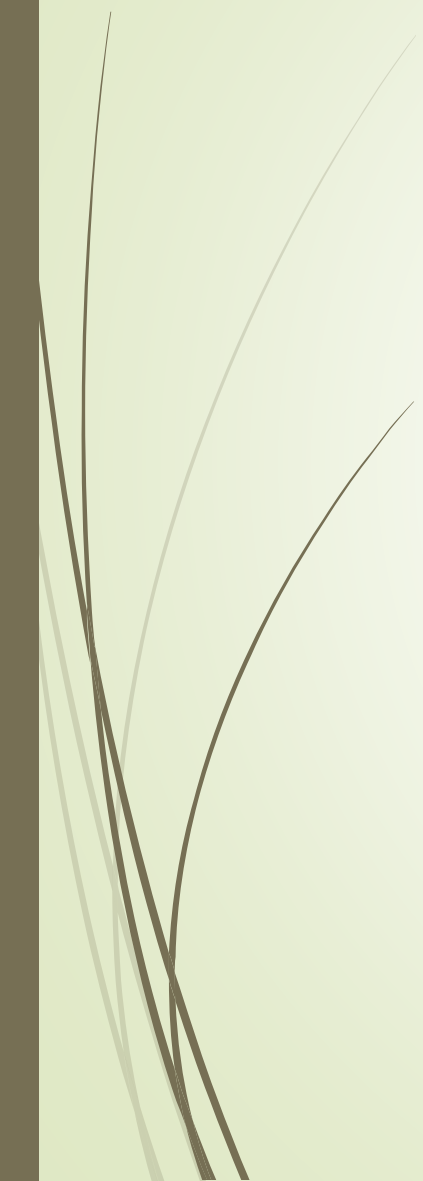
| PART                  | RESALE REVENUE<br>PER UNIT | RECYCLING<br>REVENUE PER UNIT | PROCESSING<br>COST PER UNIT | DISPOSAL COST<br>PER UNIT |
|-----------------------|----------------------------|-------------------------------|-----------------------------|---------------------------|
| Printed circuit board | \$7.88                     | \$3.54                        | \$2.12                      | \$0.00                    |
| Coil                  | 6.67                       | 4.56                          | 3.32                        | 0.00                      |
| Frame                 | 0.00                       | 0.00                          | 4.87                        | 1.97                      |
| Processor             | 8.45                       | 4.65                          | 3.43                        | 0.00                      |
| Plastic case          | <u>0.00</u>                | <u>0.00</u>                   | <u>4.65</u>                 | <u>3.98</u>               |
| Total                 | \$23.00                    | \$12.75                       | \$18.39                     | \$5.95                    |



# Ready for ...



QUIZ



**LO 1.1** Productivity increases when:

- a) inputs increase while outputs remain the same.
- b) inputs decrease while outputs remain the same.
- c) outputs decrease while inputs remain the same.
- d) inputs and outputs increase proportionately.
- e) inputs increase at the same rate as outputs.

**LO 1.2** Services often:

- a) are tangible.
- b) are standardized.
- c) are knowledge based.
- d) are low in customer interaction.
- e) have consistent product definition.

**LO 1.3** Productivity:

- a) can use many factors as the numerator.
- b) is the same thing as production.
- c) increases at about 0.5% per year.
- d) is dependent upon labor, management, and capital.
- e) is the same thing as effectiveness.

**LO 1.4** Single-factor productivity:

- a) remains constant.
- b) is never constant.
- c) usually uses labor as a factor.
- d) seldom uses labor as a factor.
- e) uses management as a factor.

**LO 1.5** Multifactor productivity:

- a) remains constant.
- b) is never constant.
- c) usually uses substitutes as common variables for the factors of production.
- d) seldom uses labor as a factor.
- e) always uses management as a factor.

**LO 1.6** Productivity increases each year in the U.S. are a result of three factors:

- a) labor, capital, management
- b) engineering, labor, capital
- c) engineering, capital, quality control
- d) engineering, labor, data processing
- e) engineering, capital, data processing