OM201: Exercise#2: Productivity Calculation

(15 January 2020)

1. Art Binley is the president of a timber factory in California. His factory can produce 240 apple crates per 100 logs. He currently purchases 100 logs per day, and each log requires 3 labor-hours to process. He plans to buy a new cutting machine that can deliver 260 crates per 100 logs. He has to employ a technician to operate the new machine that leads to an increase of 8 labor-hours per day.

   1.1 What is the labor productivity of the current system? (crates per labor-hour)

Labor productivity = $\frac{240}{3 \times 100}$ = 0.8 crates/hr.

   1.2 What is the labor productivity of the improved system with a new machine? (crates per labor-hour)

labor productivity = $\frac{260}{(3 \times 100) + 8}$ = 0.8442 crates/hr.

2. Art Binley has decided to look at his productivity from the multi-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. He pays an average of $10 per labor-hour. 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.

2.1 What is the multi-factor productivity of the current system? (crates per dollar)

$$\text{Multi-factor productivity} = \frac{240}{(300 \times \$10) + \$350 + \$1{,}000}$$

$$= \frac{240}{\$4{,}350}$$

$$= 0.0552 \text{ crates / dollar}$$

2.2 What is the multi-factor productivity of the improved system with a new machine? (crates per dollar)

$$\text{Multi-factor productivity} = \frac{260}{(308 \times \$10) + \$150 + \$1{,}000}$$

$$= \frac{260}{\$4{,}230}$$

$$= 0.0615 \text{ crates / dollar}$$