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# Lecture 6 & Lecture 7

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# (Productivity)

**Productivity is defined as a ratio between the output volume and the volume of inputs. In other words, it measures how efficiently production inputs, such as labor and capital, are being used in an economy to produce a given level of output.**

## SAMPLE PROBLEMS FOR PRODUCTIVITY

### Example # 1

A company that processes fruits and vegetables is able to produce 400 cases of canned peaches in one half hour with four workers. What is the labor productivity?

Solution:

Labor productivity = Quality Produced / Labors Hours  
= 400 cases (4 workers x 1/2 hours / workers)  
= 200 cases per labor hour

### Example # 2

A wrapping paper company produced 2,000 rolls of paper one day. Standard price is \$ 1/roll. Labor cost was \$ 160, material cost was \$ 50, and overhead was \$ 320. Determine the multifactor productivity.

Solution:

Multifactor productivity =  
Quality produced \* standard price / (Labor cost + Material cost + Overhead)  
= 2,000 rolls x \$ 1 / (\$160+ \$ 50 + \$320)  
= 3.77 rolls output per dollars

### Example # 3

- a) Find the productivity if four workers installed 720 square yards of carpeting in eight hours.
- b) Compute for the productivity of a machine which produced 68 usable pieces in two hours.

Solution:

a) Productivity = yards of carpeting install / Labors Hours worked  
= 720 square yard / (4 workers x8 hours / worker)  
= 720 yards / 32 Hours  
= 22.5 yards/ hours

b) Productivity = Usable Pieces / Production Time  
= 68 usable pieces / 2 hrs  
= 34 pieces/ hours

#### **Example # 4**

Determine the multifactor productivity for the combined input of the labor and the machine time using the following:

Input:

Labor: \$ 1,000

Materials: \$ 520

Overheads: \$ 2,000

Keep in mind the Production is 1760 unit

Solution:

Multifactor Productivity = Output / (Labor + Materials + Overheads)

= 1,760 Units / (\$ 1,000 + \$ 520 + \$ 2,000)

= 0.50 units

Solve the Following Problems

#### **Problem No#1**

Collins Little Company has a staff of 4, each working 8 hours per day (for a payroll cost of \$ 640 / day) and overhead expenses of \$ 400 / day. Collins processes and closes on 8 titles each day.

The company recently purchased a computerized title search system that will allow the processing of 14 titles per day. Although the staff, their works hours, and pay will be same, the overheads expenses are now \$ 800 per day.

Solution:

Labor productivity with the old system:

= 8 titles per day / 32 labor hours = 0.25 titles per hour

Labor productivity with the new system:

= 14 titles per day / 32 labor hours = 0.44 title per labor hours

Multifactor productivity with the old system:

= 8 titles per day / (640 + 400) = 0.0077 titles per dollars

Multifactor productivity with the new system:

= 14 titles per day / (640 + 800) = 0.0097 titles per dollars

#### **Problem No#2**

At Modem Lumber, Inc., Art Binley, a president and a producer of an apple crates sold to growers, has been able, with his current equipment, to produces 240 crates per 100 logs. He currently purchases 100 logs per day, and each logs required 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 increases 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 buyers is hired? What is the Growth in productivity in this case?

Solution:

- a) Current labor productivity = 240 crates / 100 logs (3 hours per log)  
= 240 / 300  
= 0.8 create per labor hour
- b) Labor productivity with buyer = 260 crates / (100 logs (3 hours per logs) + 8 hours )  
= 260 / 308  
= 0.844 crates per labor hours
- c) Growth = (0.844 – 0.8)/0.8 x100 =

**Problem No#3**

Calculate the productivity for the following operations:

- a) Three employees processed 600 insurance policies last week. They 8 hours per day, 5 days per week.
- b) A team of workers made 400 units of product, which is valued by its standard cost of \$10 each (before markups for other expenses and profit). That accounting department reported that for this job the actual cost were \$ 400 per labor, \$1000 for materials and 4300 for overhead:

Solution:

- a) Labor productivity = Policies processed  
Employee, hours  
= 600 policies  
3 (40)  
= 5 policies per hours
- b) Multifactor productivity = Quality at standard cost  
Labor + Materials + Overheads  
= 400units (\$10/units)  
\$400 + \$1000 + \$ 3000  
= \$4000  
\$1700  
=2.35

**Problem No#4**

Student tuition at Boering University is \$ 100 per semester credit hours. The states supplement school revenue by matching student tuition, dollars per dollars. Average class size for typical three credit course is 50 students. Labor costs are \$4000 per class, material costs are \$20 per student, and overhead cost are \$25,000 per class.

Find:

- a) What is the multifactor productivity ratio?
- b) If instructors work an average, what is the labor productivity ratio? (Keep in mind that professor delivering the lecture work 14 hours per week the semester last for 16 weeks)

a) Value of Output = ( 50 student )x (3 credit hours) x (\$ 100 tuition + \$ 100 state support)

class student credit hours = \$ 30,000 per class

Value of Output = Labor + Materials + Overheads

= \$ 4000 + (\$20 per student x 50 students) + \$25,000 Class

= \$ 30,000 per class

Multifactor productivity = Output/ Input

= \$ 30,000 / class

\$ 30,000/ class

= 1.00

b) Labor productivity is the ratio of the value of output to the labor hours. The value of output is the same as in part (a), or \$ 30,000 per class, so Labor hours of input = 14 hours x 16 week = 224hours per class

Labor productivity = Output/ Input = \$ 30,000 per class 224 hours per class = \$ 133.93 per hours