

PRODUCTIVITY

PRODUCTIVITY

- It is an index that measures output (goods and services) relative to input (labor, material, energy and other resources) used to produce them.
- A measure of the effective use of resources, usually expressed as the ratio of output to input.

$$\text{Productivity} = \frac{\text{Outputs}}{\text{Inputs}}$$

- For non-profit organization higher productivity means lower costs
- For profit organization productivity is important factor in determining how competitiveness of a company .
- For a nation rate of productivity is of great importance

PRODUCTIVITY

Partial measures

- output/(single input)

Multi-factor measures

- output/(multiple inputs)

Total measure

- output/(total inputs)

$$\text{Productivity} = \frac{\text{Outputs}}{\text{Inputs}}$$

EXAMPLE

10,000 Units Produced

Sold for \$10/unit

500 labor hours

Labor rate: \$9/hr

*What is the
labor productivity?*

Cost of raw material: \$5,000

Cost of purchased material: \$25,000

EXAMPLE--LABOR PRODUCTIVITY

$$10,000 \text{ units}/500\text{hrs} = 20 \text{ units/hour}$$

or we can arrive at a unit-less figure

$$(10,000 \text{ unit} * \$10/\text{unit})/(500\text{hrs} * \$9/\text{hr}) = 22.22$$

Can you think of any advantages or disadvantages of each approach?



EXAMPLE--MULTIFACTOR PRODUCTIVITY

$$\text{MFP} = \frac{\text{Output}}{\text{Labor} + \text{Materials}}$$

$$\text{MFP} = \frac{(10,000 \text{ units}) * (\$10)}{(500) * (\$9) + (\$5000) + (\$25000)}$$

$$\text{MFP} = 2.90$$

COMPUTING PRODUCTIVITY

Partial measures: based on single input

Partial productivity = $\frac{\text{Output}}{\text{Capital}}$ $\frac{\text{Output}}{\text{Labor}}$ $\frac{\text{Output}}{\text{Machine}}$ $\frac{\text{Output}}{\text{Energy}}$

Multifactor measures: based on multiple input, more than one input, multifactor measures.

Multifactor productivity (MFP) = $\frac{\text{Output}}{\text{Labor} + \text{Machine}}$ $\frac{\text{Output}}{\text{Labor} + \text{Capital} + \text{Energy}}$

Total measures: based on total input and output

Total productivity = $\frac{\text{Goods or services produced}}{\text{All inputs used to produce them}}$

PARTIAL PRODUCTIVITY MEASURES ...

Labor Productivity	Units of output per labor hour Units of output per shift Value-added per labor hour
Machine Productivity	Units of output per machine hour Dollar value of output per machine hour
Capital Productivity	Units of output per dollar input Dollar value of output per dollar input
Energy Productivity	Units of output per kilowatt-hour Dollar value of output per kilowatt-hour

WHY PRODUCTIVITY MEASUREMENT IS NEEDED ...

- Used to track performance over time
- Allows managers to judge performance
- To decide where improvements are needed
- Judge the performance of the entire industry
- Judge the productivity of a country as a whole
- Serve as scorecards of the effective use of resources
- Productivity relates to competitiveness
- National productivity relates to nation's standard of living

PRODUCTIVITY GROWTH

- Productivity growth is the increase in productivity from one period to the next relative to the productivity in the preceding period.

Productivity Growth =

$$\frac{\text{Current period productivity} - \text{Previous period productivity} \times 100}{\text{Previous period productivity}}$$

For example if productivity increased from 80 to 84, the growth rate would be -

$$\frac{84 - 80}{80} \times 100\% = 5\%$$

EXAMPLE

- A wrapping paper company produced 2000 rolls of paper one day. Standard price is 1Tk/roll. Labor cost was Tk. 160, material cost was Tk. 50 and overhead was Tk. 320. Determine the multifactor productivity.

- **Solution:**

$$\text{Multifactor productivity} = \frac{\text{Quantity produced @ standard price}}{\text{Labor cost} + \text{Material cost} + \text{Overhead}}$$

$$= \frac{2000 \text{ rolls} \times 1\text{Tk. / roll}}{160 + 50 + 320}$$

$$= 3.77 \text{ Tk output per Tk. input}$$

EXAMPLE

- Compute the multifactor productivity measure for each of the weeks shown. Assume 40 hrs weeks and an hourly wage Tk. 12. Overhead is 1.2 times to total weekly labor cost. Material cost is Tk. 3 per kg. Standard price is Tk. 140 per unit.

Week	Output (Units)	Workers	Materials (Kg)
1	300	6	45
2	338	7	46
3	322	7	46

- Also compute the productivity growth of week 2, 3 over week 1 of this problem.

EXAMPLE-SOLUTION

MFP (Week 1)

= Total Output /Multiple Inputs

= (300 units X TK 140 per unit)/ [(6 workers X 40 hrs per week X TK 12 per labor hour) + 1.2 (6 workers X 40 hrs per week X TK 12 per labor hour) + (45 Kg X TK 3 per Kg)]

= TK. 42000 / [(Tk. 2880) + 1.2 (TK. 2880) + (TK. 135)]

= TK. 42000 / [(Tk. 2880) + (TK. 3456) + (TK. 135)]

= TK. 42000 / TK. 6471

= 6.49 Tk output per Tk. input

MFP (Week 2)

= 6.28 Tk output per Tk. input

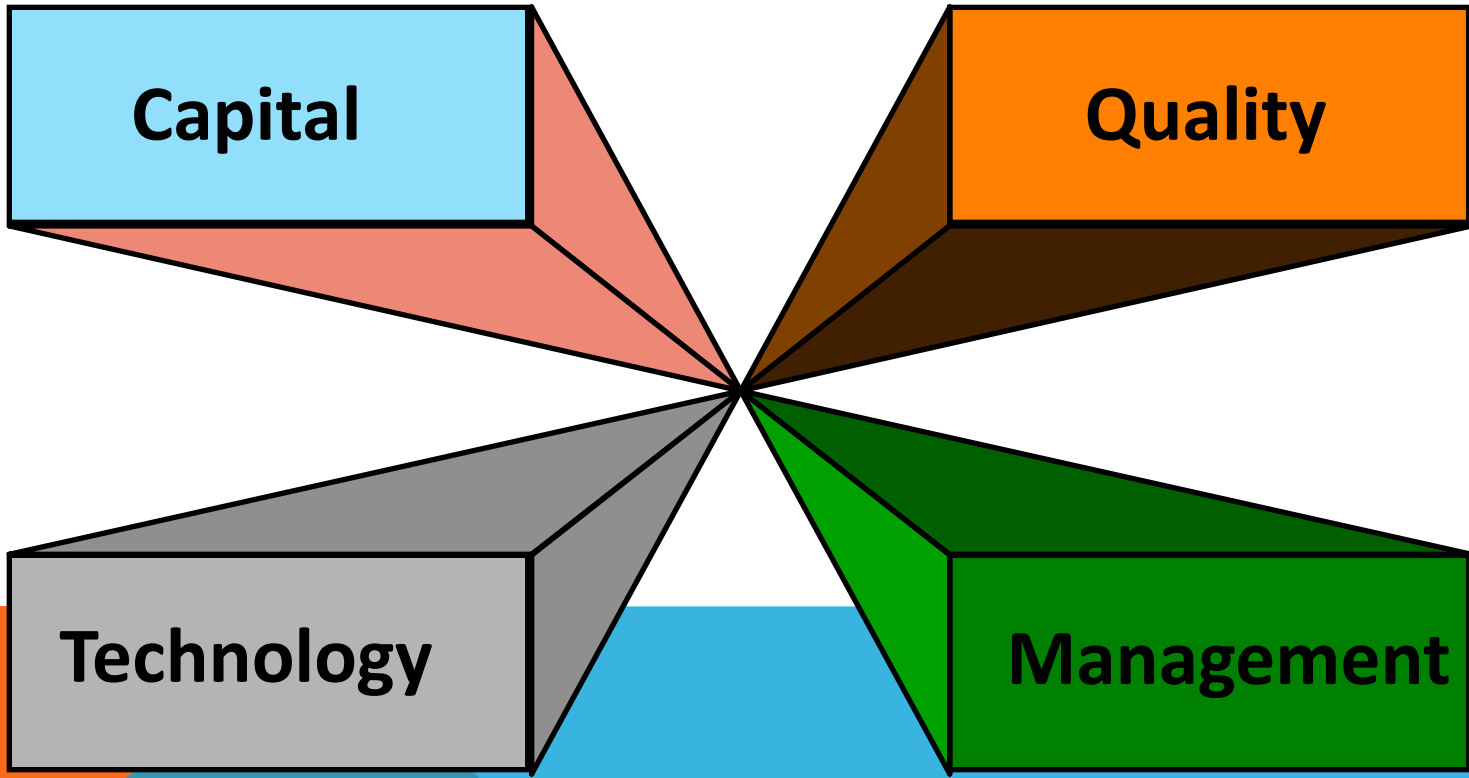
Productivity Growth of Week 2 =

[(Current period productivity – Previous period productivity) / Previous period productivity] x 100 %

= [(6.28-6.49) / 6.49] X 100%

= - 3.236%

FACTORS AFFECTING PRODUCTIVITY



FACTORS THAT AFFECT PRODUCTIVITY

Numerous factors affect productivity include

- Methods
- Capital
- Quality
- Technology and
- Management

Other factors that affect productivity include

- Standardizing
- Quality differences
- Use of the internet
- Computer viruses
- Scrap rates
- New workers
- Safety

FACTORS THAT AFFECT PRODUCTIVITY

Other factors that affect productivity include

- Shortage of information technology workers and other technical workers
- Layoffs
- Labor turnover (negative effect on productivity; replacements need time to get up to speed)
- Design on workspace

Incentive plans

IMPROVING PRODUCTIVITY ...

- Develop productivity measures
- Determine critical operations
- Develop methods for productivity improvements
- Establish reasonable goals
- Get management support
- Measure and publicize improvements
- Don't confuse productivity with efficiency