SOS POLITICAL SCIENCE AND PUBLIC ADMINISTRATION,

JIWAJI UNIVERSITY, GWALIOR

MBA HRD II SEM

PAPER: HRD (202)

SUBJECT NAME: WAGES & SALARY ADMINISTRATION

UNIT-V

TOPIC: PRODUCTIVITY MEASUREMENT

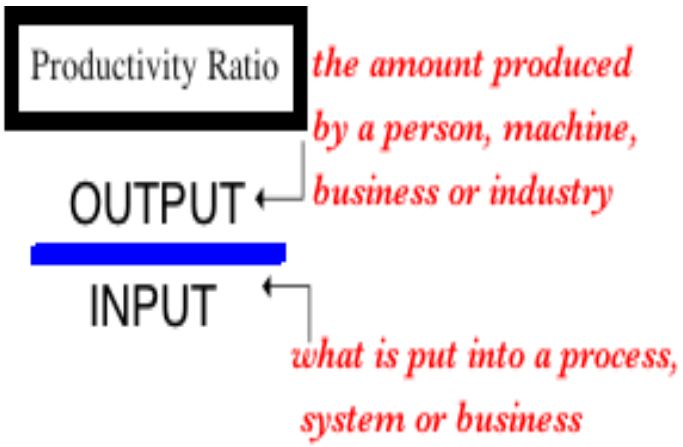
PRODUCTIVITY MEASUREMENT: Productivity describes various measures of the efficiency of production. A productivity measure is expressed as the ratio of output to inputs used in a production process,

i.e. Mathematically : **P = O / I**

The measure of productivity is defined as a total output per one unit of a total input. Productivity is a crucial factor in production performance of firms and nations. Increasing national productivity can raise living standards because more real income improves people's ability to purchase goods and services, enjoy leisure, improve housing and education and contribute to social and environmental programs. Productivity growth also helps businesses to be more profitable. There are many different definitions of productivity and the choice among them depends on the purpose of the productivity measurement and/or data availability. Productivity is a measure of the efficiency of production. Productivity measurements must show a linkage with profitability; after all, it is the bottom line

that is the ultimate barometer of a company's success. An input in any production process comprises capital, labor, material and energy.

$$\text{Productivity} = \frac{\text{Units of output}}{\text{Units of input}}$$



Productivity of each resource can be measured separately. Such measurement gives single factor productivity. The method of calculating productivity considering more than one resource is called multi-factor productivity approach to measuring productivity. Total productivity (total productivity index) refers to the productivity of all resources put together. So productivity of all resources put together gives total productivity.

There are broadly three types of productivity measurements and these are explained below:

1. Single-Factor Productivity Measurement.

2. Multi-Factor Productivity Measurement.

3. Total (Composite) Factor Productivity Measures.

4. Total Productivity Model.

Main Productivity Measures

Type of output measure	Type of input measure		
	Labor	Capital	Capital and labor
Gross output	Labor productivity (based on gross output)	Capital productivity (based on gross output)	Capital-labor MFP (based on gross output)
Value added	Labor productivity (based on value added)	Capital productivity (based on value added)	Capital-labor MFP (based on value added)
	Single factor productivity measures		Multifactor productivity (MFP) measures

Market Realist

Source: OECD

1. SINGLE-FACTOR PRODUCTIVITY MEASUREMENT:

Single-Factor Productivity is a measure of output against specific input. Partial productivity is concerned with efficiency of one class of input. Its significance lies in its focus on utilization of one resource. Labor productivity is a single factor productivity measure. It is the ratio of output to labor input (units of output per labor hour). Material productivity is the ratio of output to materials input.

Machine productivity is the ratio of machine units of output per machine hour, output per unit machine. Capital productivity is the ratio of output to capital input and it is measured in Rupees. Energy Productivity is units of output per kilowatt-hour (Rupee value of output per kilowatt-hour).

Advantages of Single-Factor Productivity:

i. Ease in obtaining relevant data and easy to comprehend.

ii. Acts as a good diagnostic measure to identify areas of improvement by evaluating inputs separately across the output.

iii. Ease in comparing with other businesses in the industry.

Disadvantages of Single-Factor Productivity:

i. Does not reflect the overall performance of the business.

ii. Misinterpreted as technical change or efficiency/effectiveness of labor.

iii. Management may identify wrong areas of improvements if the focus areas of a business are not examined accurately.

2. MULTI-FACTOR PRODUCTIVITY MEASUREMENT:

The concept of multi-factor productivity was developed by Scott D. Sink, multi-factor productivity measurement model considered labour, material and energy as major inputs. Capital was deliberately left out as it is most difficult to estimate how much capital is being consumed per unit/ time.

The concept of depreciation used by accountants make it further difficult to estimate actual capital being consumed. Multi-factor productivity is ratio of output to a group of inputs such as; labor, energy and material. Multi-factor productivity is an index of output obtained from more than one of the resources (inputs) used in production. It is the ratio of net output to the sum of associated labor and other factor inputs.

Advantages of Multi-Factor Productivity:

i. Considers intermediate inputs of a business.

ii. Measures technical change in an industry. Disadvantages of Multi-Factor Productivity.

iii. Difficulty in obtaining all the inputs.

iv. Difficulty in communicating inter-industry linkages and aggregation.

3. TOTAL (COMPOSITE) FACTOR PRODUCTIVITY MEASURES:

The Total Factor Productivity model developed by John W. Kendrick in 1951, he has taken only labour and capital as only two input factors. In an effort to improve productivity of labour, company may install more machinery and then productivity of labour will go up bringing down the capital productivity.

$$TFP = \frac{\text{Net Output}}{\text{(Labor + Capital) Input}}$$

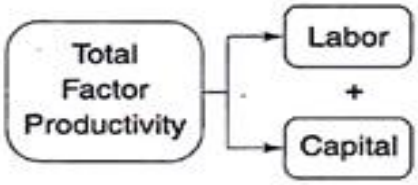


Fig. 2.3 Total Factor Productivity Measurement

Therefore, labour and capital are considered to be the most significant in contribution in the process of production.

Advantages of Total Factor Productivity:

i. Ease in obtaining data and to understand.

ii. Ease in understanding.

iii. Ease of aggregation across industries.

Disadvantages of Total Factor Productivity:

i. Not a good measure for technological change.

ii. Other inputs are ignored.

iii. Net output does not reflect the efficiency of production system in a proper way.

4. TOTAL PRODUCTIVITY MODEL:

Total Productivity Model was developed by David J. Sumanth in 1979 considered five items as inputs. These are human, material, capital, energy and other expenses. This model can be applied in any manufacturing or service organization.

Total Tangible Output = Value of finished units produced + Partial units produced + Dividends from securities + Interests from bonds + other incomes.

Total Tangible Inputs = Value of human inputs + Capital inputs + Materials purchased + Energy inputs + other expenses (taxes, transport & office expenses etc.).

Advantages of Total Productivity:

i. All quantifiable inputs are considered.

ii. Sensitivity analysis can be done.

iii. Provides both firm level and operational unit level productivity.

Disadvantages of Total Productivity:

i. Data is difficult to compute.

ii. Does not consider intangible factors of input and output.

BENEFITS FROM PRODUCTIVITY GROWTH:

Productivity growth is a crucial source of growth in living standards. Productivity growth means more value is added in production and this means more income is available to be distributed.

At a firm or industry level, the benefits of productivity growth can be distributed in a number of different ways:

- To the workforce through better wages and conditions;
- To shareholders and superannuation funds through increased profits and dividend distributions;
- To customers through lower prices;
- To the environment through more stringent environmental protection; and
- To governments through increases in tax payments (which can be used to fund social and environmental programs).

Productivity growth is important to the firm because it means that it can meet its (perhaps growing) obligations to workers, shareholders, and governments (taxes and regulation), and still remain competitive or even improve its competitiveness

in the market place. Adding more inputs will not increase the income earned per unit of input (unless there are increasing returns to scale). In fact, it is likely to mean lower average wages and lower rates of profit. But, when there is productivity growth, even the existing commitment of resources generates more output and income. Income generated per unit of input increases. Additional resources are also attracted into production and can be profitably employed.

DRIVERS OF PRODUCTIVITY GROWTH:

In the most immediate sense, productivity is determined by the available technology or know-how for converting resources into outputs, and the way in which resources are organized to produce goods and services. Historically, productivity has improved through evolution as processes with poor productivity performance are abandoned and newer forms are exploited. Process improvements may include organizational structures (e.g. core functions and supplier relationships), management systems, and work arrangements, manufacturing techniques, and changing market structure. A famous example is the assembly line and the process of mass production that appeared in the decade following commercial introduction of the automobile.

Mass production dramatically reduced the labor in producing parts for and assembling the automobile, but after its widespread adoption productivity gains in automobile production were much lower. A similar pattern was observed with electrification, which saw the highest productivity gains in the early decades after introduction. Many other industries show similar patterns. The pattern was again followed by the computer, information and communications industries in the late 1990s when much of the national productivity gains occurred in these industries.

There is a general understanding of the main determinants or drivers of productivity growth. Certain factors are critical for determining productivity growth. The Office for National Statistics (UK) identifies five drivers that interact to underlie long-term productivity performance: investment, innovation, skills, enterprise and competition. (ONS 3, 20)

- ***Investment*** is in physical capital — machinery, equipment and buildings. The more capital workers have at their disposal, generally the better they are able to do their jobs, producing more and better quality output.
- ***Innovation*** is the successful exploitation of new ideas. New ideas can take the form of new technologies, new products or new corporate structures and ways of working. Speeding up the diffusion of innovations can boost productivity.
- ***Skills*** are defined as the quantity and quality of labour of different types available in an economy. Skills complement physical capital, and are needed to take advantage of investment in new technologies and organisational structures.
- ***Enterprise*** is defined as the seizing of new business opportunities by both start-ups and existing firms. New enterprises compete with existing firms by new ideas and technologies increasing competition. Entrepreneurs are able to combine factors of production and new technologies forcing existing firms to adapt or exit the market.
- ***Competition*** improves productivity by creating incentives to innovate and ensures that resources are allocated to the most efficient firms. It also forces existing firms to organise work more effectively through imitations of organisational structures and technology.