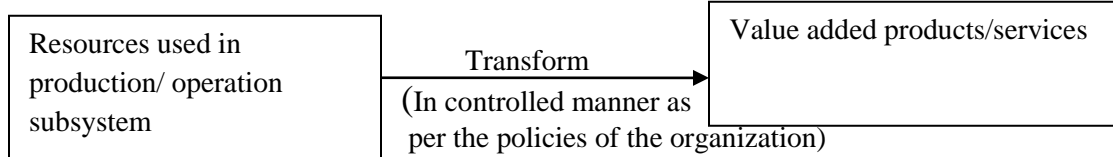


# CHAPTER-I

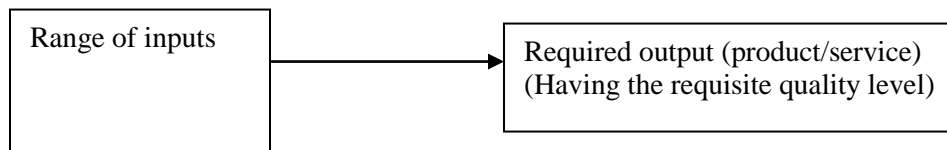
## PRODUCTIVITY

### 1.1 Introduction

Production/Operation management is the process which combines and transforms various resources used in the production/operation subsystem of the organization into value added products/services in a controlled manner as per the policies of the organization.



Production/Operation function:



The set of interrelated management activities which are involved in manufacturing certain products is called production management and for service management, then corresponding set of management activities is called as operation management.

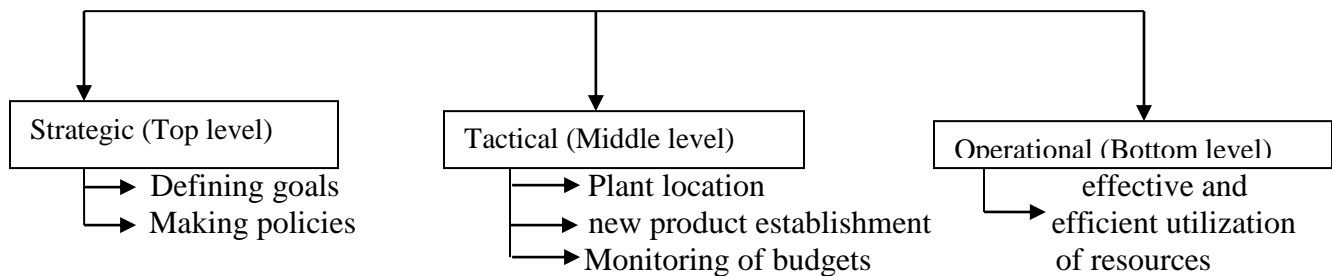
#### Examples: (Products/goods)

Boiler with a specific capacity,  
Constructing flats,  
Car, bus, radio, television.

#### Examples: (Services)

Medical facilities,  
Travel booking services.

In the process of managing various subsystems of the organization executives at different levels of the organization need to track several management decisions. The management decisions are Strategic, tactical and operational.



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Corrections from feedback information:

- ❖ Tight quality check on the incoming raw-material.
- ❖ Adjustment of machine settings.
- ❖ Change of tools.
- ❖ Proper allocation of operations to machines with matching skills.
- ❖ Change in the production plans.

## 1.2 Productivity:

Productivity is a relationship between the output (product/service) and input (resources consumed in providing them) of a business system. The ratio of aggregate output to the aggregate input is called productivity.

$$\text{Productivity} = \text{output/Input}$$

- ❖ For survival of any organization, this productivity ratio must be at least 1. If it is more than 1, the organization is in a comfortable position. The ratio of output produced to the input resources utilized in the production.

## 1.3 Importance:

Benefits derived from higher productivity are as follows:

- ✓ It helps to cut down cost per unit and thereby improve the profits.
- ✓ Gains from productivity can be transferred to the consumers in form of lower priced Products or better quality products.
- ✓ These gains can also be shared with workers or employees by paying them at higher rate.
- ✓ A more productive entrepreneur can have better chances to exploit expert opportunities.
- ✓ It would generate more employment opportunity.
- ✓ Overall productivity reflects the efficiency of production system.
- ✓ More output is produced with same or less input.
- ✓ The same output is produced with lesser input.
- ✓ More output is produced with more input.
- ✓ The proportional increase in output being more than the proportional increase in input.

## 1.4 Productivity Measurement:

Productivity may be measured either on aggregate basis or on individual basis, which are called total and partial measure.

Total productivity Index/measure = Total output/ Total input

$$= \frac{\text{Total production of goods and services}}{\text{Labour+material+capital+Energy+management}}$$

Partial productivity indices, depending upon factors used, it measures the efficiency of individual factor of production.

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$$\text{Labour productivity Index/Measure} = \frac{\text{Output in unit}}{\text{Man hours worked}}$$

$$\text{Management productivity Index/Measure} = \frac{\text{Output}}{\text{Total cost of management}}$$

$$\text{Machine productivity Index/Measure} = \frac{\text{Total output}}{\text{Machine hours worked}}$$

$$\text{Land productivity Index/Measure} = \frac{\text{Total output}}{\text{Area of Land used}}$$

$$\text{Partial Measure} = \frac{\text{Output}}{\text{Labour}} \quad \text{or} \quad \frac{\text{Output}}{\text{Capital}} \quad \text{or} \quad \frac{\text{Output}}{\text{Materials}} \quad \text{or} \quad \frac{\text{Output}}{\text{Energy}}$$

## PROBLEMS:

### Example-1

The input and output data for an industry given in the table. Find out various productivity measures like total, multifactor and partial measure.

### Output and Input production data in dollar (\$)

#### Output

1. Finished units	10,000
2. Work in progress	2,500
3. Dividends	1,000
4. Bonds	-----
5. Other income	-----

#### Input

1. Human	3,000
2. Material	153
3. Capital	10,000
4. Energy	540
5. Other Expenses	1,500

#### **Solution:**

$$\text{Total measure} = \frac{\text{Total Output}}{\text{Total Input}} = \frac{13,500}{15,193} = 0.89$$

$$\text{Multi factor measure} = \frac{\text{Total Output}}{\text{Human+Material}} = \frac{13,500}{3,153} = 4.28$$

$$\text{Multi factor measure} = \frac{\text{Finished units}}{\text{Human+Material}} = \frac{10,000}{3,153} = 3.17$$

$$\text{Partial Measure}_1 = \frac{\text{Total Output}}{\text{Energy}} = \frac{13,500}{540} = 25$$

$$\text{Partial Measure}_2 = \frac{\text{Finished units}}{\text{Energy}} = \frac{10,000}{540} = 18.52$$

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**Note:** For multifactor and partial measures it is not necessary to use total output as numerator. Often, it is desirable to create measures that represent productivity as it relates to some particular output of interest.

Other fields for the measurement of partial measures of productivity are:

<b>Business</b>	<b>Productivity Measure</b>
Restaurant	Customers (Meals) per labour hour
Retail Store	Sales per square foot
Utility plant	Kilowatts per ton of coal
Paper mill	Tons of paper per cord of wood

### **Example-2**

**A furniture manufacturing company has provided the following data. Compare the labour, raw materials and supplies and total productivity of 1996 and 1997.**

**Output: Sales value of production in dollar (\$)**  
**22,000 (in 1996) and 35,000 (in 1997)**

	<u><b>1996</b></u>	<u><b>1997</b></u>
<b>Inputs: Labour</b>	<b>10,000</b>	<b>15,000</b>
<b>Raw materials and Supplies</b>	<b>8,000</b>	<b>12,500</b>
<b>Capital equipment depreciation</b>	<b>700</b>	<b>1,200</b>
<b>Other</b>	<b>2,200</b>	<b>4,800</b>

**Solution:**

	<b>1996</b>	<b>1997</b>
a. Partial productivities		
Labour	2.20	2.33
Raw materials and Supplies	2.75	2.80
b. Total Productivity	1.05	1.04

## **1.5 Productivity measurement approaches at the enterprises level:**

As stated above total productivity is expressed as the ratio of aggregate output to the aggregate input. That the total overall performance is captured in this ratio, becomes apparent, if we examine the relationship between this ratio and the age-old performance measure of profit.

If the outputs and input for the period for which productivity is measured, are expressed in rupees, then under such restrictive assumptions one can write:

Aggregate output = Gross Sales = G (Say)

Aggregate input = Cost = C (Say)