

## BA4204- OPERATIONS MANAGEMENT

### DEFINE PRODUCTIVITY IN PRODUCTION AND OPERATION MANAGEMENT

Productivity is the quantitative relation between what we produce and we use as a resource to produce them, *i.e.*, arithmetic ratio of amount produced (output) to the amount of resources (input). Productivity can be expressed as:

$$\text{PRODUCTIVITY} = \text{total output} / \text{total input}$$

Productivity refers to the efficiency of the production system. It is the concept that guides the management of production system. It is an indicator to how well the factors of production (land, capital, labor and energy) are utilized.

European Productivity Agency (EPA) has defined productivity as, *“Productivity is an attitude of mind. It is the mentality of progress, of the constant improvements of that which exists. It is the certainty of being able to do better today than yesterday and continuously. It is the constant adaptation of economic and social life to changing conditions. It is the continual effort to apply new techniques and methods. It is the faith in progress.”*

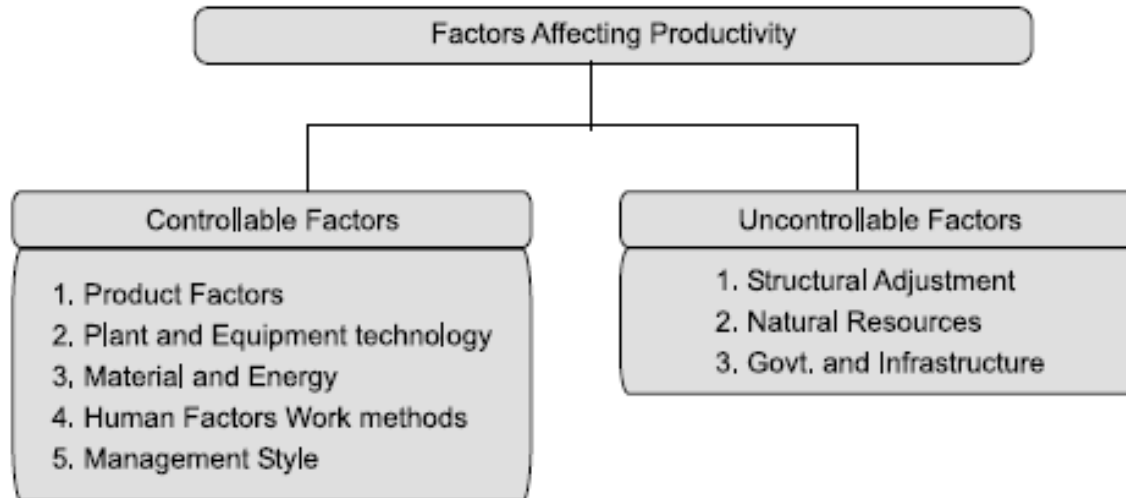
A major problem with productivity is that it means many things to many people. Economists determine it from Gross National Product (GNP), managers view it as cost cutting and speed up, engineers think of it in terms of more output per hour. But generally accepted meaning is that it is the relationship between goods and services produced and the resources employed in their production.

### FACTORS INFLUENCING PRODUCTIVITY

Factors influencing productivity can be classified broadly into two categories:

**controllable (or internal) factors and un-controllable (or external) factors.**

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### CONTROLLABLE FOR INTERNAL FACTORS

1. **Product factor:** In terms of productivity means the extent to which the product meets output requirements product is judged by its usefulness. The cost benefit factor of a product can be enhanced by increasing the benefit at the same cost or by reducing cost for the same benefit.
2. **Plant and equipment:** These play a prominent role in enhancing the productivity. The increased availability of the plant through proper maintenance and reduction of idle time increases the productivity. Productivity can be increased by paying proper attention to utilization, age, modernization, cost, investments etc.
3. **Technology:** Innovative and latest technology improves productivity to a greater extent. Automation and information technology helps to achieve improvements in material handling, storage, communication system and quality control. The various aspects of technology factors to be considered are:

- Size and capacity of the plant,
- Timely supply and quality of inputs,
- Production planning and control,
- Repairs and maintenance,
- Waste reduction, and

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- Efficient material handling system.
4. **Material and energy:** Efforts to reduce materials and energy consumption brings about considerable improvement in productivity.
- Selection of quality material and right material.
  - Control of wastage and scrap.
  - Effective stock control.
  - Development of sources of supply.
  - Optimum energy utilization and energy savings.
5. **Human factors:** Productivity is basically dependent upon human competence and skill. Ability to work effectively is governed by various factors such as education, training, experience aptitude etc., of the employees. Motivation of employees will influence productivity.
6. **Work methods:** Improving the ways in which the work is done (methods) improves productivity, work-study and industrial engineering techniques and training are the areas which improve the work methods, which in term enhance the productivity.
7. **Management style:** This influence the organizational design, communication in organization, policy and procedures. A flexible and dynamic management style is a better approach to achieve higher productivity.

### UNCONTROLLABLE (OR) EXTERNAL FACTORS

**Structural adjustments:** Structural adjustments include both economic and social changes. Economic changes that influence significantly are:

- A. Shift in employment from agriculture to manufacturing industry,
- B. Import of technology, and
- C. Industrial competitiveness.

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Social changes such as women's participation in the labor force, education, cultural values, attitudes are some of the factors that play a significant role in the improvement of productivity.

**Natural resources:** Manpower, land and raw materials are vital to the productivity improvement.

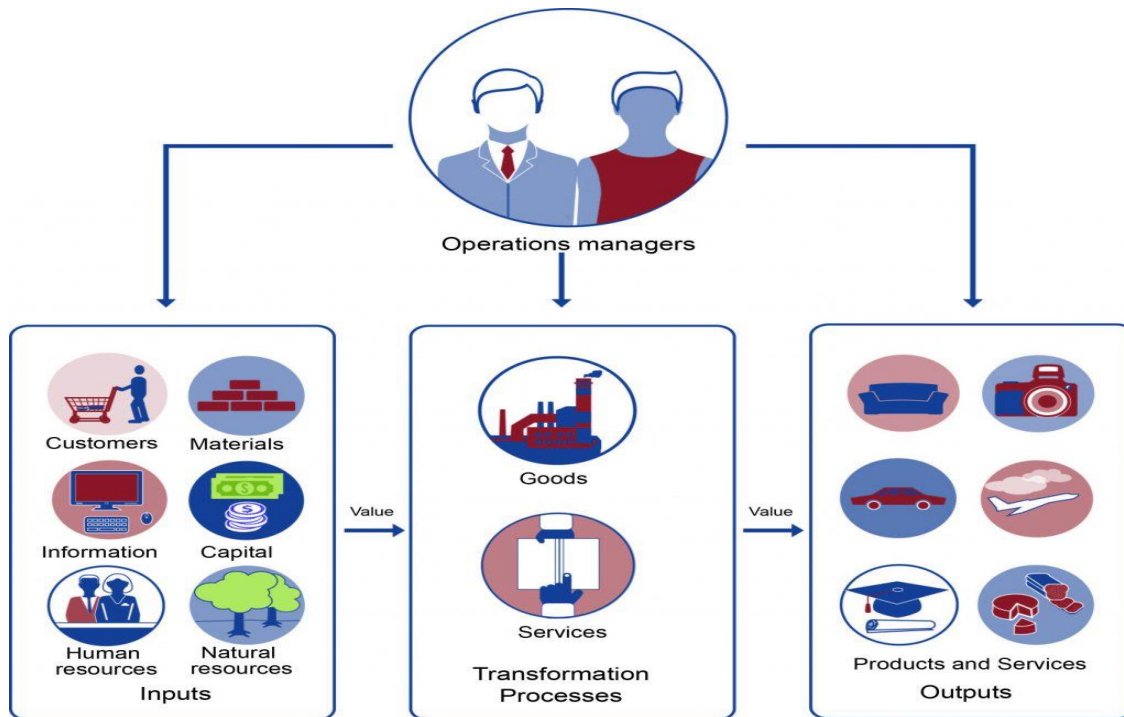
**Government and infrastructure:** Government policies and program are significant to productivity practices of government agencies, transport and communication power, and fiscal policies (interest rates, taxes) influence productivity to the greater extent.

### APPLICATION:

#### **Operations Management in Manufacturing**

Every organization—whether it produces goods or provides services—sees Job 1 as furnishing customers with quality products. Thus, to compete with other organizations, a company must convert resources (materials, labor, money, information) into goods or services as efficiently as possible. The upper-level manager who directs this transformation process is called an operations manager. The job of operations management (OM) consists of all the activities involved in transforming a product idea into a finished product. In addition, operations managers are involved in planning and controlling the systems that produce goods and services. In other words, operations managers manage the process that transforms input into outputs. Figure illustrates these traditional functions of operations management.

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All manufacturers set out to perform the same basic function: to transform resources into finished goods. To perform this function in today's business environment, manufacturers must continually strive to improve operational efficiency. They must fine-tune their production processes to focus on quality, to hold down the costs.

### WORLD CLASS MANUFACTURING

It is a collection of concepts, which set standard for production and manufacturing for another organization to follow. Japanese manufacturing is credited with pioneer in concept of world-class manufacturing. World-class manufacturing was introduced in the automobile, electronic and steel industry.

World-class manufacturing is a process driven approach where various techniques and philosophy are used in one combination or other.

Some of the techniques are as follows:

- Make to order
- Streamlined Flow
- Smaller lot sizes

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- Collection of parts
- Doing it right first time
- Cellular or group manufacturing
- Total preventive maintenance
- Quick replacement
- Zero Defects
- Just in Time
- Increased consistency
- Higher employee involvement
- Cross Functional Teams
- Multi-Skilled employees
- Visual Signaling
- Statistical process control

Idea of using above techniques is to focus on operational efficiency, reducing wastage and creating cost efficient organization. This leads to creation of high-productivity organization, which used concurrent production techniques rather than sequential production method.

### World Class Manufacturers

World-class manufacturers tend to implement best practices and also invent new practices as to stay above the rest in the manufacturing sector. The main parameters which determine world-class manufacturers are quality, cost effective, flexibility and innovation.

World class manufacturers implement robust control techniques but there are five steps, which will make the system efficient. These five steps are as follows:

- **Reduction of set up time and in tuning of machinery:** It is important that organizations are able to cut back time in setting up machinery and also tune machinery before production.
- **Cellular Manufacturing:** It is important that production processes are divided into according to its nature, with similar nature combined together.
- **Reduce WIP material:** It is normal tendency of manufacturing organization to maintain high levels of WIP material. Increased WIP leads to more cost and decreased WIP induces more focus on production and fast movement of goods.

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- **Postpone product mutation:** For to achieve a higher degree of customization many changes are made to final product. However, it is important that mutation conceived for the design stage implement only after final operation.
- **Removal the trivial many and focus on vital few:** It is important for organization to focus on production of products which are lined with forecast demand as to match customer expectation.

### Principles of World Class Manufacturing

There are three main principles, which drive world-class manufacturing.

- Implementation of just in time and lean management leads to reduction in wastage thereby reduction in cost.
- Implementation of total quality management leads to reduction of defects and encourages zero tolerance towards defects.
- Implementation of total preventive maintenance leads to any stoppage of production through mechanical failure.

### Aspects of World Class Manufacturing

The main aspects of the world-class manufacturing are as follows:

- Industrial culture area
- Market/client area
- Product development area
- Operations area
- E-Performance area

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