

MB0044 – Production and Operations Management**Assignment Set - 1**

Q1. What is meant by productivity? Write a brief note on capital productivity.

Answer: Productivity is a measure of the efficiency of the system and looks at the economies achieved during the processes. Every process will have a number of contributors which help in achieving maximum productivity. The processes are: People, Machines, Facilitating goods, Ancillary equipments, and Technology. Each of these elements attempts to enhance the contribution of other elements.

Opportunities exist at all stages of the workflow in the entire system to introduce measures for increasing productivity. However in actual manufacturing situations, the inefficiencies will have cascading effect in hampering productivity. Communication, effective review processes and innovative methods will ensure optimisation of resources. Building up reliability into the equipments, managing the supply chain to economise on the cost factors improves productivity.

Quality circles are very efficient in incorporating low cost and non-intrusive methods of improving productivity and quality throughout the organisation.

Quality circles:

- Involve all persons who are actually involved in the production system and the information they elicit and bring about improvements that are highly cost effective
- Unveil creativity and encourage team work and bring about improvements almost on a day to day basis
- Bring continuous incremental changes in a harmonious way instead of dramatic changes
- Encourage identification of possible failures and seek methods of preventing things going wrong

Capital Productivity

Capital deployed in plant, machinery, buildings and the distribution systems as well as working capital are the components of the cost of manufacturing. Demand fluctuations, uncertainties of production owing to breakdowns, and inventories being created drag the

productivity down. Therefore, strategies are needed to maximise the utilisation of the funds allotted towards capital. The strategies included are:

- Outsourcing strategies
- Methods improvement
- Balancing of workstations
- Quality circles
- Rationalisation of packaging methods

Q2. (a) What is automation?

(b) What are the kinds of automation?

Answer :

(a) Automation :

Automation is the use of scientific and technological principles in the manufacture of machines that take over work normally done by humans.

Figure shows a sample automation production process.

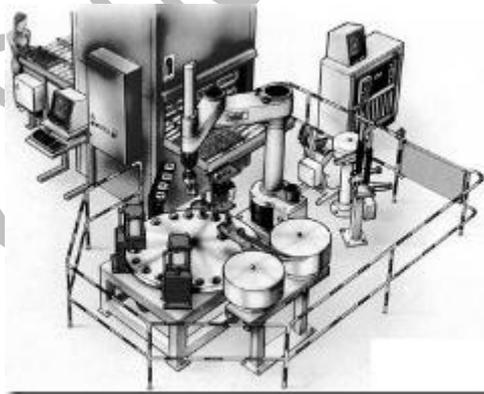


Figure : Automation

For services, automation usually means increase in quality and productivity using labour saving devices. Automation is ideal when the service provided or the product manufactured is highly standardised. Some extent of automation can be designed even with customisation, that is, product or services meant to produce or deliver low volumes specific to a requirement. The cost per unit determines the extent of automation required. Automation

systems cost huge sums of money and therefore, a deep analysis of the various factors has to be done.

(b) There are three kinds of automation: fixed, programmable, and flexible.

1. **Fixed:** By its very nature, fixed automation is rigid. They are designed for high volume production and their rigidity ensures less variability. They are not amenable to change in product or process. They need minimal human intervention. Examples: Oil refineries and chemical processing units.

2. **Programmable:** Programming devices enable machines to operate automatically. The machines have sensing and control devices that enable this. The simplest of them called machine attachments replace human effort. They guide, locate, move, and achieve relative positions by means of cams, optical sensing, and load sensing mechanisms and activate the controls to remove human intervention. Numerically controlled machines read instructions and convert them to machine operations. Computers are used for controlling one machine or a number of them and they have programmes written into them for operations. They are Computer Numerically Controlled or, for short, CNC machines.

3. **Flexible:** Robots are higher in the order of automation as they perform a variety of tasks. They are designed to move materials by holding them in their arms and making precise movements according to programmes written into the computers that reside in them. They simulate human actions. They can grip and hold tools with the help of sensors. These sensors are sensitive to touch and force to 'know' that the material is to be held with the requisite pressure for the conduct of operations. Vision sensors are used for inspection, identification and guidance. They use optics based instruments to gather data and feed them to the computers for activating the other parts of the robot.

With the help of automation, 100% inspection of components can be done which ensures highest quality. Identification and movement of materials are helped by bar codes which are read and fed into the system for monitoring quantity, location, and movement. They help the automated systems to sort information and provide information for effecting any changes necessary.

To make effective use of automated machines, we need to have the movement of materials from and to different stations as also stores, automated. Automated Storage and Retrieval Systems (ASRS), receive orders for materials from anywhere in the production area, collect materials and deliver materials to the workstations.

Computers and information systems are used for placing orders for materials, giving commands and adjusting inventory records which show the location and quantity of materials available/needed. Continuous updating gives a clear picture for all concerned to enable them initiate action to keep the throughput smooth. Automated Guided Vehicle Systems (AGVS) like pallet trucks and unit load carriers follow embedded guide wires or paint strips to reach destinations as programmed.

Q3. What are the factors that influence the plant location?

Answer : General factors

The general factors that influence the plant location are listed below

1. **Availability of land:** Availability of land plays an important role in determining the plant location. Many-a-time, our plans, calculations and forecasts suggest a particular area as the best to start an organisation. However, availability of land may be in question. In such cases, we will have to choose the second best location.

2. **Availability of inputs:** While choosing a plant location, it is very important for the organisation to get the labour at the right time and raw materials at good qualities. The plant should be located:

- Near to the raw material source when there is no loss of weight
- At the market place when there is a loss of weight in the material
- Close to the market when universally available, so as to minimise the transportation cost

3. **Closeness to market places:** Organisations can choose to locate the plant near to the customers' market or far from them, depending upon the product they produce. It is advisable to locate the plant near to the market place, when:

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