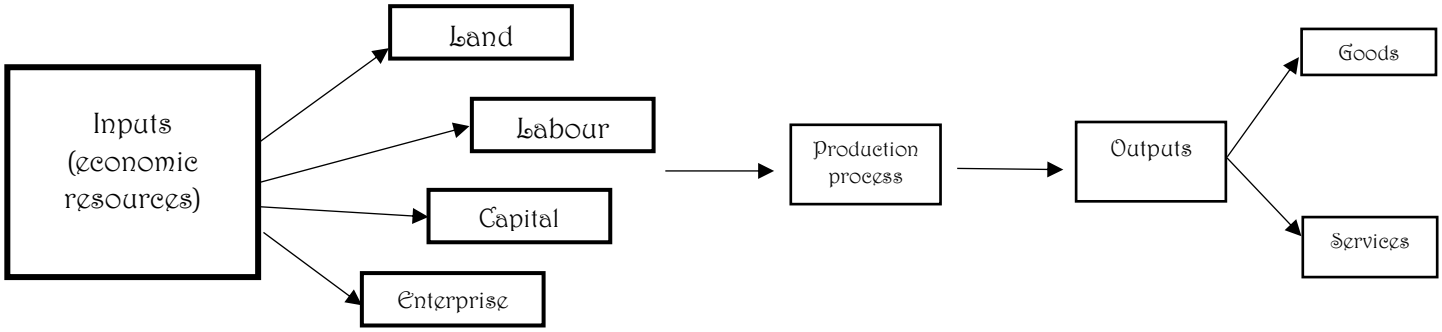
Production of goods and services

Managing resources effectively to produce goods and services

- Production is the provision of a product or service to satisfy customer wants and needs. This process involves the firm adding value to a product
- The production process applies to manufacturing and service industry as well



- For a business to be competitive it should combine these inputs of resources efficiently so that the business makes the best use of resources at its disposal to keep costs low and increase profits
- Labour intensive – where businesses employ more workers and less machinery
- Capital intensive – where businesses use more machinery than employees

Operations department

- Role: to take inputs and change them to outputs for customer use
- Inputs could be physical goods or services
- The operations manager is responsible for making sure that the raw materials are provided and made into goods and services

A typical manufacturing business will have:

i. A factory manager responsible for the quantity and the quality of products coming off a production line, including the maintenance of the production line and necessary repairs
ii. A purchasing manager responsible for providing the materials, components and equipment required
iii. A research and development manager responsible for the design and testing of new production processes and products

Productivity

- Productivity is the output measured against the inputs used to create it
- Can be used to measure its efficiency
- Productivity can be measured by:

$$Productivity = \frac{quantity\ of\ output}{quantity\ of\ input}$$

- Businesses usually measure the productivity of one factors of production, usually labour
- Labour productivity can be calculated by:

$$Labour\ productivity = \frac{Output\ (over\ a\ given\ period\ of\ time)}{Number\ of\ employees}$$

- Productivity can either mean using fewer inputs to produce the same output or using the same input to produce a greater output
- The greater the efficiency, the amount produced per employee increases, so the cost of production decreases
- Increase in productivity results in better competition

Ways to increase productivity

- Improve layout of machinery to reduce time wastage
- Improving labour skills by training
- Introducing automation
- Improved quality control/ assurance reduces waste
- Improve employee motivation
- Introduce new technology
- Improve inventory control
- Train staff to be more efficient

Benefits of increasing efficiency/productivity

- Increased output relative to inputs required
- Lower costs per unit (average cost)
- Fewer workers may be needed, leading to lower wage costs
- Higher wages for workers increase motivation

Why businesses hold inventories (stock)

- Inventories can take various forms, including raw materials, components, partly finished goods, or finished products ready for delivery. It can even include inventory of spare parts for machinery in case of breakdowns
- The buffer inventory level is the inventory held to deal with uncertainty in customer demand and deliveries of supplies
- When inventories reach the reorder point, they will be reordered to bring the inventory level back up to the maximum level. Businesses must reorder before inventories get too low to allow for time for goods to be delivered
- If inventory levels get too low, they might actually run out if there is an unexpectedly high demand for the goods

- If too high level of inventory is held then this costs a lot of money, the business has bought goods that are not being used, when the money could have been invested in other areas for better use
- Effectively managing inventory levels is crucial to all business especially manufacturing and retail businesses

Lean Production

- Lean production is a term for those techniques used by businesses to cut down on waste and increase efficiency
- Lean production cuts out any activities which do not add value to a product or service

There are seven types of waste that can occur in production:

1. Overproduction: producing goods before they have been ordered by customers, thus increasing storage costs and the chances of goods being damaged whilst in storage
2. Waiting; when goods are not moving or being processed then waste is occurring
3. Transportation: moving goods around unnecessarily causing waste and not adding to the value of the product. Goods may also be damaged during transportation
4. Unnecessary inventory: if there is too much inventory then this takes up space and may get in the way of production
5. Motion: any actions that wastes time, it may be a health or safety risk for employees. This also applies to the unnecessary moving around of machinery
6. Over processing: if complex machinery is being used to complete simple tasks, then this is wasteful. Some activities in producing the goods may not be necessary if the design of the product is low
7. Defects: any faults require the goods being fixed and time can be wasted inspecting the products

Benefits of lean production

Costs are saved through:

- Less storage of raw materials and components
- Quicker production of goods and services
- No need to repair defects or provide a replacement service for a dissatisfied customer
- Better use of equipment
- Cutting out some processes which speed us production
- Less money tied up in inventories
- Improved health and safety leading to less time off work due to injury

Reduced costs lead to lower prices for customers, businesses being more competitive and possibly also increased profits.

Lean production can be achieved by the following 3 methods:

Kaizen

- Kaizen is a Japanese term for continuous improvement through the elimination of waste

- The improvement does not come from investing in new technology or equipment but through ideas of the workers themselves
- Small groups of workers meet regularly to discuss problems and possible solutions

Advantages of Kaizen:

i. Increased productivity
ii. Reduced amount of space needed for the production process
iii. Work in progress is reduced
iv. Improved layout of factory, allowing some jobs to be combined permitting other employees to carry out some other job in the factory

Just in time (JIT) inventory control

- A production method that involves reducing or virtually eliminating the need to hold inventories of raw materials or unsold inventories of he finished product. Supplies arrive just at the time they are needed
- The raw materials or components are delivered just in time to be used in the production process, the making of any part is undertaken just in time to be used in the next stage of production and the finished product is made just in time to be delivered to the customer
- All this reduces the cost of holding inventory, as no raw materials and components are ordered to keep in the warehouse just in case it is needed
- Warehouse space is not needed, again reducing costs
- The finished product is sold quickly so money will come back to the business more quickly, helping its cash flow
- The business will need a very efficient system of ordering raw materials and components and extremely reliable suppliers

Cell Production

- Whereby the production line is divided into separate, self-contained units (cells), each making an identifiable part of the finished product, instead of having a flow or mass production line
- This method of production improves the morale of the employees and makes them work harder so they become more efficient
- The employees feel more valued and less likely to strike or cause disruption

Methods of production

Job production

- Where a single product is made at a time
- This is where products are made specifically to order

- Examples include: bakeries, specialist manufacturers that produce machinery to fit a specific specification such as bridges, ships, made to measure suits, cinema films and individual computer programs that perform specialised tasks

Advantages:

i. It is most suitable for personal services or one-off products
ii. The product meets the exact requirements of the customer
iii. The workers often have more varied jobs
iv. More varied jobs increase motivation and job satisfaction
v. Flexible – used for high quality goods and services meaning a higher price can be charged

Disadvantages:

i. Skilled labour is often needed
ii. The costs are higher because it is often labour intensive
iii. Production often takes a long time
iv. Products are specifically made to order so errors can be expensive to correct
v. Materials may have to specifically purchased leading to higher costs

Batch Production

- Batch processing is where a quantity of one product is made, then a quantity of another item will be produced
- This is where similar products are made in blocks and batches
- Examples include: a certain number of chairs being made and then a certain number of tables or batch of a particular size of jeans is produced and then a batch of another size

Advantages:

i. It is flexible way of working and production can easily be changed from one product to another
ii. It still gives some variety to workers' jobs
iii. It allows more variety to products which would otherwise be identical, this gives more customer choice
iv. Production may not be affected to any great extent if machinery breaks down

Disadvantages:

i. It can be expensive as semi-finished or finished products will need moving about
ii. Machinery has to be rest between production batches which means there is a delay in production and output is lost
iii. Warehouse space will be needed for stocks of raw materials and components. This is costly

Flow Production

- Flow production is where large quantities of a product are produced in a continuous process. It is sometimes referred to as mass production.
- This is when large quantities of a product are produced in a continuous process

Advantages:

i. There is a high output of a standardised product
ii. Costs are kept low and therefore prices are also lower
iii. It is easy for capital intensive production methods to be used- reducing labour costs and increasing efficiency
iv. Capital intensive methods allow workers to specialise in specific, repeated tasks and therefore the businesses may only need relatively unskilled workers- little training may be needed
v. It may benefit from economies of scale
vi. Low average costs and therefore low prices usually meaning higher sales
vii. Automated production lines can operate 24 hours a day
viii. Goods are produced quickly and cheaply
ix. There is no need to move goods from one part of the factory to another as with batch production, so time is saved

Disadvantages:

i. It is a very boring system for employees, so there is little job satisfaction leading to a lack of motivation for employees
ii. There are significant storage requirements- costs of inventories of raw materials/components and finished products can be very high
iii. The capital costs of setting up the production line can be very high
iv. If one machine breaks down then the whole production line will be halted

Factors affecting which method of production to use

- The nature of the product
- The size of the market
- The nature of demand
- The size of the business

How technology has changed production methods

- Automation – where equipment used in the factory is controlled by a computer to carry out mechanical processes. The production line will mainly consist of machines and very few people to ensure that everything proceeds smoothly
- Mechanism- where the production is done by machine but mainly operated by people. Robots are machines that are programmed to do tasks and are particularly useful in unpleasant, dangerous and difficult jobs. They are quick, accurate and work nonstop 24 hours a day

- CAD (Computer aided design)- is computer software that draws items being designed more quickly and allows them to be rotated to see an item from all angles as opposed to drawing it several times. Used for designing new products, re-styling old products and when detailed technical drawings are needed
- CAM (Computer aided manufacture) - where computers monitor the production process and control machines or robots on the factory floor.
- CIM (Computer integrated manufacture) – the total integration of CAD and CAM. The computers that design the products are linked directly to computers that aid the manufacturing process
- EPOS (electronic point of sale) – this is used at checkouts where the operator scans the bar code of each item individually
- EFTPOS (electronic funds transfer point of sale) – this is where the electronic cash register is connected to the retailers' main computer and also to banks over a wide area computer network

Advantages of new technology:

- Productivity is greater as new production methods are used
- Greater job satisfaction stimulates workers, as routine is boring and done by machines
- Types of jobs have changed as more skilled workers are required to operate machinery, businesses most offer training to existing workers, workers are more motivated and therefore improve the quality of their work
- Better quality products are produced owing to better production methods and better-quality control
- More accurate consumer demand results from computers being used to monitor inventory levels
- Quicker communication and reduced paperwork, owing to computers, lead to increased profitability
- The information that is available to managers is greater and this results in better and quicker decision making
- New products are introduced as new methods of production are introduced. The market and tastes of the customer have changed

Disadvantages of new technology:

i. Unemployment rises and machines/computers replace people
ii. Expensive to invest in, large quantities of the products have to be sold to cover purchasing costs
iii. Employees are unhappy with the changes in their work practises when new technology is introduced
iv. New technology is changing all the time and will often become outdated quite quickly and replaced fast if the business is to remain competitive