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# Chapter 18

## Production of goods and services

### Managing resources effectively to produce goods and services

Production is the process of providing a product or service to meet consumer needs by adding value to raw materials and components.

### Operations department

The Operations department in a business transforms inputs into outputs for customer use, with the Operations Manager responsible for ensuring raw materials are supplied and processed.

A typical manufacturing business will have:

- » A Factory Manager who will be responsible for the quantity and quality of products coming off a production line; this will include the maintenance of the production line and other necessary repairs
- » A Purchasing Manager who will be responsible for providing the materials, components and equipment required for the production
- » A Research and Development Manager who will be responsible for the design and testing of new production processes and products.

### Productivity

The level of production is the total output of a business in a given time period, The **productivity** of a business can be measured by:

$$\text{Productivity} = \frac{\text{Output}}{\text{Quantity of input}}$$

Businesses often want to measure the productivity of one of the factors of production or inputs, usually labour. This is measured by dividing the output over a given period of time by the number of employees:

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

There are several ways to increase productivity and efficiency. These include:

- » Improve quality of the product and inventory control to reduce waste.
- » Replace employees with machines – automation.
- » Improve training to increase employee efficiency.
- » Motivate employees more effectively.

» Introduce new technology.

» Use more automation

### Benefits of increasing efficiency/productivity

» Reduced inputs needed for the same output level.

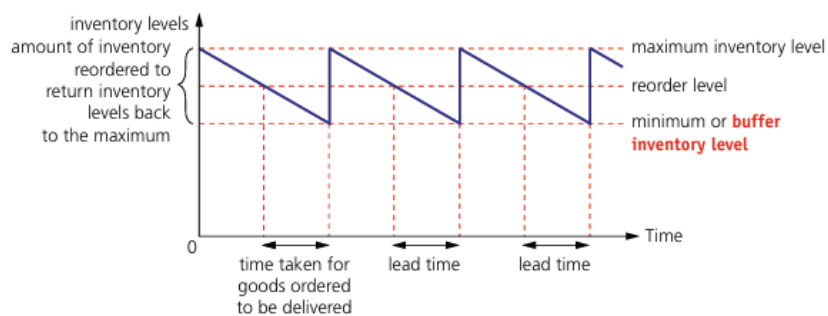
» Lower costs per unit (average cost).

» Fewer workers may be needed, possibly leading to lower wage costs.

» Higher wages might now be paid to workers, which increases motivation.

### Why businesses hold inventories (stock)

Inventory levels are crucial for businesses to maintain production and satisfy customer demand. They can take various forms, including raw materials, components, finished goods, and spare parts.



### Lean production

Lean production covers a variety of techniques used by businesses to cut down on waste of resources, including time, and therefore increase efficiency.

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

» Overproduction – producing goods before they have been ordered by customers. This results in high storage costs and possible damage to goods while in storage.

» Waiting – when goods are not moving or being processed in any way, waste is occurring.

» Transportation – moving goods around unnecessarily causes waste and is not adding value to the product. Goods may also be damaged when they are being moved around.

» Unnecessary inventory – if there is too much inventory then this takes up space, may get in the way of production and costs money.

» Motion – any actions, including bending or stretching movements of the body of the employee, wastes time. It may also be a health and safety risk for the employees.

» Over-processing – if complex machinery is being used to perform simple tasks, then this is wasteful.

» 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 or components

» Quicker production of goods or services

» No need to repair defects or provide a replacement service for a dissatisfied customer

» Better use of equipment

» Cutting out some processes, which speeds up production

» Less money tied up in inventories

» Improved health and safety, leading to less time off work due to injury.

Lean production can be achieved by using the following methods:

» Kaizen

» just-in-time inventory control

» cell production

### Kaizen

Kaizen, a Japanese concept, emphasizes continuous improvement and waste elimination through workers' ideas rather than investing in new technology. Regular meetings between small groups help identify problems and find solutions.

The advantages of Kaizen might be:

» Increased productivity

» Reduced amount of space needed for the production process

» Work-in-progress is reduced

» Improved layout of the factory floor may allow some jobs to be combined, thereby freeing up employees to carry out some other job in the factory

### Just-in-time inventory control

**Just-in-time (JIT)** is a production method that reduces inventory of raw materials and components, ensuring they are delivered just in time for use in the production process, and the finished product is delivered to the customer.

» All this reduces the costs of holding inventory, as no raw materials and components are ordered to keep in the warehouse just in case they are needed.

» Warehouse space is not needed, again reducing costs.

» The finished product is sold quickly and so money will come back to the business more quickly, helping its cash flow.

### Cell production

Cell production divides production lines into self-contained units, improving employee morale, efficiency, and value, reducing the risk of strikes or disruptions, and promoting hard work and productivity.

### Methods of production

Tara used three main methods of production during the growth of her company:

» Job production

» Batch production

» Flow production.

### Job production

Specialty manufacturing involves creating products to order, such as dishes, bridges, ships, suits, cinema films, or computer programs, with each order unique and potentially repeatable.

### Advantages of job production

» It is most suitable for personal services or 'one-off' products.

» The product meets the exact requirements of the customer.

» The workers often have more varied jobs (they don't carry out just one task).

» More varied work increases employee motivation – giving them greater job satisfaction.

» It is flexible and often used for high-quality goods and services, meaning that a higher price can be charged.

### Disadvantages of job production

» Skilled labour is often used, and this raises costs.

» The costs are higher because it is often labour intensive.

» Production often takes a long time.

» Products are specially made to order and so any errors can be expensive to correct.

» Materials may have to be specially purchased, leading to higher costs.

### Batch production

Batch production involves creating similar products in specific quantities, such as a bakery making batches of bread, houses built together using the same design, furniture production (making a certain number of tables and chairs), or clothing production (making a specific size of jeans).

### Advantages of batch production

» It is a flexible way of working and production can easily be changed from one product to another.

- » It still gives some variety to workers' jobs.
- » It allows more variety to products which would otherwise be identical. This gives more consumer choice
- » Production may not be affected to any great extent if machinery breaks down.

### Disadvantages of batch production

- » It can be expensive as semi-finished products will need moving about to the next production stage.
- » Machines have to be reset between production batches which means there is a delay in production and output is lost.
- » Warehouse space will be needed for inventories of raw materials, components and finished batches of goods. This is costly.

### Flow production

Mass production involves large quantities of a standardized product produced continuously along a production line. This process, also known as flow production.

### Advantages of flow production

- » There is a high output of a standardised product.
- » Costs of making each item are kept low and therefore prices are also lower.
- » It is easy for capital-intensive production methods to be used – reducing labour costs and increasing efficiency.
- » Capital-intensive methods allow workers to specialise in specific, repeated tasks and therefore the business may require only relatively unskilled workers – little training may be needed.
- » It may benefit from economies of scale in purchasing.
- » Low average costs and therefore low prices usually mean high sales.
- » Automated production lines can operate 24 hours a day.
- » There is no need to move goods from one part of the factory to another as with batch production, so time is saved.

### Disadvantages of flow production

- » It is a very boring system for the workers, so there is little job satisfaction, leading to a lack of motivation for employees.
- » There are significant storage requirements – costs of inventories of raw materials/components and finished products can be very high unless just-in time systems are used.
- » The capital costs of setting up the production line can be very high.
- » If one machine breaks down the whole production line will have to be halted.

### Factors affecting which method of production to use

The factors which determine which method of production to use are as follows:

»Job production is used for unique products or services, while flow production is used for mass production using automated production lines.

»Batch production is used for small local or niche markets, while flow production is used for international markets, catering to higher demand and limited product quantities.

»Demand nature influences production methods.

»Small businesses lack capital for large scale production using automated production lines, preferring job or batch methods, and require larger operations.

### How technology has changed production methods

Technological advances have allowed the mechanisation and automation of production methods in many industries.

» Automation is where the equipment used in the factory is controlled by a computer to carry out mechanical processes,

» Mechanisation is where the production is done by machines but operated by people, Robots are machines that are programmed to do tasks, and are particularly useful for unpleasant, dangerous and difficult jobs.

» CAD (computer-aided design) is computer software that draws items being designed more quickly and allows them to be rotated to see the item from all sides instead of having to draw it several times. It is used to design new products or to re-style existing products.

» CAM (computer-aided manufacture) is where computers monitor the production process and control machines or robots on the factory floor.

» CIM (computer-integrated manufacturing) is the total integration of computer aided design (CAD) and computer-aided manufacturing (CAM).

### The advantages of new technology

» Productivity is greater as new, more efficient production methods are used, reducing average costs.

» Greater job satisfaction stimulates workers, as routine and boring jobs are now done by machines.

» More skilled workers may be needed to use and maintain the new technology. Businesses must offer training to existing workers in the use of new technology.

» Better quality products are produced owing to more accurate production methods.

- » Quicker communication and reduced paperwork, owing to computers, lead to increased profitability.
- » The information that is available to managers through the use of IT is much greater and this should result in better and quicker decision making.
- » New 'high tech' products are introduced as new technology makes completely new products available.

#### The disadvantages of new technology

- » Unemployment could rise as machines/computers replace people on the factory floor and in offices.
- » It is expensive to invest in new technology products and machinery. This increases the risks as large quantities of products need to be sold to cover the cost of purchasing the equipment.
- » Employees may be unhappy with the changes in their work practices when new technology is introduced.
- » New technology is changing all the time and will often become outdated quite quickly and need to be replaced if the business is to remain competitive.

## Chapter 19

### Costs, scale of production and break-even analysis

#### Business costs

All business activities involve costs of some sort. These costs cannot be ignored. Why does the manager need to think about costs? Some of the reasons are explained below.

- » The costs of operating the factory can be **compared** with the revenue from the sale of the sports shoes to calculate whether or not the business will make a profit or loss. This calculation is one of the most important made in any business.
- » The costs of **two different locations** for the new factory can be **compared**. This would help the owner make the best decision.
- » To help the manager decide **what price** should be charged for a pair of sports shoes.

Accurate cost information is therefore very important for managers.

#### Fixed costs and variable costs

In calculating the costs of the business, it is important to understand the difference between different types of costs. The main types of costs are **fixed costs** and **variable costs**.



## Total cost and average cost

The **total costs** of a business, during a period of time, are all fixed costs added to all variable costs of production. This total figure can then be compared with the sales revenue for the period to calculate the profit or loss made.

An **average cost per unit** can be calculated from the total cost figure. Average cost is the total cost of production divided by total output. For a sports shoe manufacturer producing 30 000 pairs of shoes each year, this could be calculated as follows:

If both the average cost of production and the level of output is known, then total cost can be calculated by multiplying average cost per unit by output.

$$\text{Total cost} = \text{average cost per unit} \times \text{output}$$

## Economies of scale and diseconomies of scale

### Economies of scale

There are five economies of scale.

#### Purchasing economies

Businesses can gain discounts by buying large quantities of components, such as materials or spare parts, which reduces unit cost and gives them an advantage over smaller businesses.

#### Marketing economies

Large businesses can benefit from owning vehicles for distribution, reducing transport costs, and reducing advertising rates. They also need fewer sales staff to sell multiple product lines, compared to smaller firms that need fewer staff.

#### Financial economies

Larger businesses are often able to raise capital more cheaply than smaller ones. Bank managers often consider that lending to large organisations is less risky than lending to small ones. A lower rate of interest is therefore often charged.

#### Managerial economies

Small businesses cannot usually afford to pay for specialist managers, for example, marketing managers and qualified accountants. This tends to reduce their efficiency. Larger companies can afford specialists and this increases their efficiency and helps to reduce their average costs.

## Technical economies

Large manufacturing firms can significantly reduce transport costs by using larger ships and vehicles. Flow production methods, which use specialist machines for continuous production, can be more cost-effective for small businesses.

## Diseconomies of scale

Is it possible for a business to become so large that it becomes less and less efficient? Is there a limit to economies of scale? Some research suggests that very large businesses may become less efficient than the smaller ones and this could lead to higher average costs for big firms.

How is this possible? It could occur because of certain **diseconomies of scale**.

### Poor communication

The larger the organisation the more difficult it becomes to send and receive accurate messages. If there is slow or inaccurate communication, then serious mistakes can occur which lead to lower efficiency and higher average costs.

### Lack of commitment from employees

Large businesses often employ thousands of workers, leading to feelings of insignificance and undervaluation. Small firms can foster close relationships with top managers, reducing commitment and efficiency, thereby increasing average costs.

### Weak coordination

Large businesses often face diseconomies of scale, where decisions take longer to reach all parts of the business and different workers, making it difficult to coordinate work and achieve objectives.

# Break-even charts: comparing costs with revenue

## The concept of break-even

‘Break-even’ is a very important idea for any business – especially a newly set up business. The **break-even level of output** or sales indicates to the owner or manager of a business the minimum level of output that must be sold so that total costs are covered.

## Drawing a break-even chart

In order to draw a **break-even chart**, we need information about the fixed costs, variable costs and **revenue** of a business.

## What does the graph show?

The **break-even point** of production is where total costs and total revenue cross. The business must therefore sell 1000 pairs of shoes in order to avoid making a loss.

## Uses of break-even charts

Apart from the use we have already made of these graphs – identifying the break-even point of production and calculating maximum profit – there are other benefits of break-even charts.

## Advantages of break-even charts

» Managers are able to read off from the graph the expected profit or loss to be made at any level of output.

- » The impact on profit or loss of certain business decisions can also be shown by **redrawing the graph**.
- » Maximum revenue now rises to \$18 000. The break-even point of production falls to 833 units and maximum profit rises to \$7000. Seems like a wise decision! However, the manager needs to consider competitors' prices too and he may not be able to sell all 2000 pairs at \$9 each. This point is explained below.
- » The break-even chart can also be used to **show the margin of safety** – the amount by which sales exceed the break-even point. In the graph above, if the firm is producing 1000 units, the safety margin is 167 units (1000 – 833).

### Limitations of break-even charts

- » Break-even charts are constructed assuming that all goods produced by the firm **are actually sold** – the graph does not show the possibility that inventories may build up if not all goods are sold.
- » Fixed costs only remain constant if the **scale of production does not change**.
- » Break-even charts concentrate on the break-even point of production, but there are **many other aspects of the operations of a business** which need to be analysed by managers.
- » The simple charts used in this section have **assumed that costs and revenues can be drawn with straight lines**. This will not often be the case.

### Break-even point: the calculation method

It is not always necessary to draw a break-even chart in order to show the break-even point of production. It is possible to calculate this.

## Chapter 20

### Achieving quality production

#### What quality means and why it is important for all businesses

Quality products help businesses:

- » Establish a brand image
- » Build brand loyalty
- » Maintain a good reputation
- » Increase sales
- » Attract new customers.

**Quality** in product or service doesn't necessarily equate to excellent performance. Consumers expect a product to be 'fit for purpose', work effectively, and not have faults, but their expectations are higher for expensive products.

#### Quality Control

**Quality Control** departments in factories ensure product delivery without defects by employing quality inspectors to regularly check samples for errors.

### Advantages of quality control

- » Tries to eliminate faults or errors before the customer receives the product or service.
- » Less training is required for the workers as inspectors are employed to check quality.

### Drawbacks of quality control

- » Expensive as inspectors need to be paid to check the product or service.
- » Identifies faulty products but doesn't find why the fault has occurred and therefore is difficult to solve the problem.
- » High costs if products have to be scrapped or reworked or service repeated.

### Quality assurance

Quality assurance is a crucial process in business, ensuring quality standards are set and applied at all stages of production to ensure customer satisfaction, increase sales, and increase profits.

### Advantages of quality assurance

- » Tries to eliminate faults or errors at all stages of production before passing on to the next stage.
- » There are fewer customer complaints.
- » Reduced costs if products do not have to be scrapped or reworked or service repeated.

### Drawbacks of quality assurance

- » Expensive to train employees to check the quality of their own work at each stage of production.
- » Relies on employees being committed to maintaining the standards set. Total Quality Management (TQM) is one approach to implementing a quality assurance system

### Total Quality Management

Japanese management has significantly influenced the way businesses ensure quality, focusing on **Total Quality Management (TQM)** aim of achieving zero faults at every stage of production.

### Advantages of TQM

- » Quality is built into every part of the production of a product or service and becomes central to the ethos of all employees.
- » It eliminates all faults or errors before the customer receives the product or service as it has a 'right first time' approach.
- » No customer complaints and so brand image is improved – leading to higher sales.
- » Reduced costs as products do not have to be scrapped or reworked or service repeated.
- » Waste is removed and efficiency increases.

### Drawbacks of TQM

- » It is expensive to train all employees to check the product or service.

» Relies on all employees following TQM ideology and accepting responsibility for quality.

### How can a customer be assured of a quality product or service?

Customers can find quality marks associated with products or services to ensure they meet specific standards. Businesses can apply for these marks, which require following rules and inspections. ISO is an example of an ISO number.

## Chapter 21

### Location decisions

#### Location of industry

Geographical location is crucial for businesses when starting or relocating due to changing business environments and objectives. Many businesses operate globally, considering location decisions, marketing, and sales on a global scale.

### Factors affecting the location of a manufacturing business

#### Production methods and location decisions

The type of production methods used in a manufacturing business is going to have a significant influence on the location of that business.

» If job production is used, the business is likely to be on a small scale and so the influence of the nearness of components, for example, will be of less importance to the business than if flow production is used.

» If flow production is used on a large scale, the location of component suppliers might be of greater importance because a large number of components will need to be transported and the cost will be high. It also depends on if JIT is used.

#### Market

Factory proximity to markets was once crucial for weight-gaining or bulk-increasing products,

#### Raw materials/components

Location is crucial for businesses when processing raw materials, as they can be heavier or more expensive to transport.

#### External economies of scale

In addition to component suppliers, firms which support the business in other ways might need to be located nearby.

#### Availability of labour

Manufacturing requires labor, and locating in areas with relevant skills can be easier and cheaper.

### Government influence

Governments may offer state-funded grants to encourage businesses to relocate to areas with high unemployment rates, but this can also lead to negative government influence,

### Transport and communications

Businesses usually need to be near to a transport system, be it road, rail, inland waterway, port or airport. Where the product is for export, the ability to easily get to a port will be important.

### Power and water supply

Electricity availability is generally unimportant, but for certain industries, having a reliable power source and water supply is essential for cooling purposes,

### Climate

This will not influence most manufacturing businesses but occasionally climate might be important.

## Factors affecting the location of a service sector business

### Customers

Located near customers is crucial for certain services, such as plumbers, electricians, hairdressers, beauticians, caterers, restaurants, cafés, gardeners, builders, and post offices.

### Personal preference of the owners

Business owners can influence where to locate the service centre. They often locate their business near to where they live.

### Technology

Technology has enabled some services to operate remotely, such as website designers, by conducting services via telephone or the internet, allowing them to choose locations on the outskirts of cities or abroad.

### Availability of labour

If a service business requires many employees, then it cannot locate in remote areas. It will need to locate near to a large town or city.

### Climate

Climate will affect some businesses, particularly if they are linked to tourism in some way. Hotels often need to locate themselves where the climate is good and near to a beach.

### Near to other businesses

Some services serve the needs of large businesses, such as firms that service equipment found in large companies..

### Rent/taxes

If the service does not need to be on the main streets in a town or city centre,

### Factors affecting the location of a retailing business

Retail businesses are in the service sector, but some special location factors often apply to these types of business. The following factors affect businesses that want a physical shop for their business.

### Shoppers

Retailers prefer popular areas like shopping malls or centers, influenced by the type of shoppers it attracts. High-income and tourist-friendly areas are ideal for selling expensive goods or small gift items.

### Nearby shops

Located near popular shops like post offices or fast-food outlets attracts potential consumers, potentially increasing business. However, proximity to competitors can also be beneficial.

### Customer parking

Where parking is convenient and near to the shops, it will encourage shoppers to visit that area and therefore possibly increase sales. A lack of parking may put people off visiting the area and sales will be lower.

### Availability of suitable vacant premises

If a suitable vacant shop or premises is not available for purchase or rent, the business may not be able to locate in the area it wishes.

### Rent/taxes

The more central the site of the premises, the higher the rent and taxes will usually be. If a retail area is popular, there will be a high demand for sites in this area and therefore the cost of renting these sites will be higher.

### Access for delivery vehicles

Access for delivery vehicles might be a consideration if it is very difficult for them to gain access to the premises.

### Security

High rates of crimes such as theft and vandalism may deter a business from locating in a particular area. Insurance companies may not want to ensure the business if it is in an area of high crime.

### Legislation

In some countries there may be laws restricting the trading or marketing of goods in particular areas.

## Factors that a business could consider when deciding in which country to locate operations

Multinational companies operate in various countries, but globalisation has led to more businesses considering international expansion or relocation.

### New markets overseas

Businesses experiencing steady overseas sales may relocate to cost-effective markets, like JCB construction equipment. For service sectors, locating near customers is essential. Better forecasts for growth in these markets make them more attractive locations for businesses.

### Cheaper or new sources of materials

If a business runs out of raw materials, it must either import alternative supplies or relocate to a more accessible location, especially for mineral sources like oil. Using raw materials at their source may be cheaper.

### Difficulties with the labour force and wage costs

Businesses in countries with rising wage costs may decide to relocate overseas to reduce costs, as seen with Western businesses in developing countries like Vietnam for textile products.

### Rents/taxes considerations

If other costs such as rent, or taxes (on profits or personal incomes) keep increasing this might cause the business to relocate to countries where these rents or taxes are lower.

### Availability of government grants and other incentives

Governments may want to encourage foreign businesses to locate in their country to bring in investment and job opportunities.

### Trade and tariff barriers

If there are trade barriers, such as tariffs (tax on imported goods) or quotas (where a limit is placed on the quantity of imports of a particular good), then by locating in that country there will be no restrictions.

## The role of legal controls on location decisions

The decisions by a firm about where to locate its business can have a very important effect on the firm's profitability. Why do governments try to influence these location decisions? Usually for two main reasons:

» To encourage businesses to set up and expand in areas of high unemployment – in some countries these are called development areas.

» To discourage firms from locating in overcrowded areas or on sites which are noted for their natural beauty.

Two types of measures are often used by governments to influence where firms locate:

» Planning regulations limit business activities in certain areas, such as residential housing, making it illegal to establish a factory or other business activities in beautiful areas, especially in rural areas.

» Government grants or subsidies encourage businesses to locate in undeveloped areas, often in areas with high unemployment rates, by providing financial aid or subsidies, such as low-rental factories.