Operations management (AS)

The operations process and its resources, production methods, productivity and efficiency, inventory management and just-in-time, capacity utilisation, and outsourcing and offshoring.

Operations management is the **planning and control of the process that turns inputs into outputs** of the right **quality, quantity, cost and time**.

4.1 The nature of operations

The operations process

Stage	Meaning
Inputs	land, labour, capital, enterprise: materials, workers, machinery
Processes	the activities that **transform** inputs
Outputs	goods and services provided to customers

Operations must be **efficient** (low cost), **flexible** (respond to changing demand) and deliver **quality**.

Production methods

Method	Description	Advantages	Disadvantages
Job	one-off, made to order (a bespoke suit)	**customised**, high price, **motivating**	**slow**, high unit cost, skilled labour
Batch	groups of identical items one stage at a time	**flexible**, some economies of scale	**stoppages** between batches, inventory of work in progress
Flow (mass)	continuous, large volume of standardised goods	**low unit cost**, high volume	**high set-up cost**, inflexible, boring work

The right method depends on **volume**, **variety**, **cost**, **customer demand** and **technology**. **Mass customisation** uses flexible technology to make **individually varied** products at flow-production cost.

Labour-intensive versus capital-intensive

Labour-intensive production relies on **workers** (a restaurant) and suits **low volume**, **customised** output. **Capital-intensive** production relies on **machinery** (a car plant) and gives **high output** and consistent

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quality at **lower unit cost** if volume is high. **Technology and automation** can cut cost and raise quality but needs **investment** and may cause **redundancy**.

Productivity and efficiency

> **Labour productivity = output ÷ number of employees (in a period). A factory makes 6,000 units with 40 workers: productivity is 150 units per worker. Productivity is output per unit of input.**

Raise productivity by **training**, **better equipment**, **motivation** and **better organisation**. Higher productivity lowers **unit cost** and makes the firm more **competitive**.

Efficiency means **using resources with little waste**; **lean production** aims to **cut waste** of all kinds (time, materials, inventory) while keeping quality.

Efficiency, effectiveness and sustainability

Efficiency is **using resources with little waste** (doing things right); **effectiveness** is **achieving the desired result** (doing the right things). **Sustainability** means operating without **harming the environment or using up resources** for future generations. Measures include **recycling and cutting waste**, **renewable energy**, **sustainable sourcing** and **less packaging**: these can **lower costs** and **improve reputation**, but need **investment** and may **raise costs in the short run**. **Operations adds value** by turning inputs into outputs worth more than their cost, through **quality, design, speed and service**.

Changing production method (for example from batch to flow) is **costly and disruptive**: new **machinery**, **retraining**, **temporary loss of output**, **redundancies** and **resistance** from staff, and the market must be **large enough** to justify it.

4.2 Inventory management

Inventory (stock) consists of **raw materials, work in progress and finished goods**. Holding it costs **storage, insurance, security** and ties up **cash**, and goods may become **obsolete or perish**. Holding too little risks **stock-outs** and lost sales.

Inventory control

The **buffer inventory** is a **minimum level kept** to avoid running out. The **re-order level** is the stock level at which **new orders are placed**, set using **lead time** (time from order to delivery) and **usage rate**. **Maximum stock** is the highest level. In a **stock control chart** the inventory falls with use, a **re-order** is placed at the re-order level, and a delivery restores stock.

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Re-order level = buffer inventory + (usage rate × lead time). Usage is 20 units a day, lead time 5 days and buffer stock 40 units, so the re-order level is 40 + (20 × 5) = 140 units. Placing the order at 140 means stock has fallen to the buffer by the time the delivery arrives.

Just-in-time (JIT)

JIT is a system where **materials arrive only when needed**, so inventory is **very low**. Advantages: **lower storage costs and waste**, less **cash tied up**, less **obsolescence**. Disadvantages: **reliable suppliers** are essential, **delays stop production**, **no buffer** if demand jumps, and **no bulk discounts** on large orders.

Just-in-case keeps buffer stock for safety.

Lean production

Lean production includes **JIT**, **kaizen** (continuous improvement), **cell production** and **quality circles**, aiming to cut **waste** and cost while maintaining quality.

Supply chain management and Just-in-case

Supply chain management is **co-ordinating everything from suppliers to customers** (purchasing, inventory, transport) to **cut cost and delay** and keep quality. **Just-in-case (JIC)** holds **large buffer stocks** so production never stops: it gives **security and quick response** but has **high storage costs, waste and tied-up cash**. **JIT** has the opposite balance (see above); adopting it needs **reliable suppliers**, **good forecasting** and often a **change of culture**.

4.3 Capacity utilisation and outsourcing

Capacity is the **maximum output** a business can produce with its existing resources.

Capacity utilisation (%) = current output ÷ maximum possible output × 100. If a factory makes 7,200 units but could make 9,000, utilisation is 80%.

	Meaning
Full capacity	all resources in use, cannot make more
Excess (spare) capacity	**under-utilised** resources, **higher unit costs**

Dealing with **over-capacity**: **boost demand** (marketing, price cuts), **sell or rationalise** assets, **rent out** capacity, **diversify**. Dealing with **under-capacity**: **overtime**, **extra shifts**, **subcontract**, **invest** in more

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capacity.

Outsourcing

Outsourcing is **contracting work to an external firm** (payroll, IT, cleaning, manufacturing). **Offshoring** is moving operations **abroad**.

Advantages	Disadvantages
lower costs, access to **specialists**, focus on **core activities**, **flexibility**	**less control** of quality, **reliance** on the contractor, **confidentiality** risks, **bad publicity** if conditions are poor

Many firms combine **outsourcing** with **in-house** work for activities that are **core** and give **competitive advantage**.

TRY IT

A factory runs at 60% capacity. Give two possible actions and a risk of each.

Boost demand through promotion or price cuts (lower margins). **Cut capacity** by selling machines (loss of ability to meet a later rise in demand).

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