Operations Management

A-Level Business ▪ Topic 4

A-Level Business



What we will cover

1. The transformation process
2. Methods of production
3. Inventory control
4. JIT & capacity
5. Outsourcing
6. Recap



1 Process and production

The transformation process



Value is added when the output is worth more than the inputs. Operations management is the job of making that process efficient.

Methods of production

job

one-off, unique – a wedding cake, a ship

batch

groups of the same item – a bakery's loaves

flow

continuous line – cars, phones

Sustainability and technology

Sustainability 可持续性: meet today's needs without harming the future – cut waste, use less energy, recycle.

Automation 自动化 raises output & quality and lowers cost, but has a high set-up cost and can replace jobs.



2 Inventory and capacity

Inventory control

Hold too much stock and you tie up cash and pay for storage. Hold too little and you lose sales.

> A **buffer stock** 缓冲库存 and a **reorder level** 再订货水平 keep the two in balance.

Reading an inventory-control chart

Maximum inventory	The **maximum inventory** 最高库存 level: the most the firm will hold, set by storage space and by cash.
Re-order level	The level that triggers a new order, set so the delivery arrives before the buffer is used.
Holding costs	**Holding costs** 持有成本: storage, insurance, obsolescence, and the cash tied up in **raw materials** 原材料 sitting on a shelf.
Buffer inventory	The minimum kept back against late deliveries or a demand spike – insurance, paid for in holding costs.

> Every inventory decision trades a holding cost against a stock-out. Just-in-time chooses one side of that trade deliberately.

Just-in-time vs just-in-case

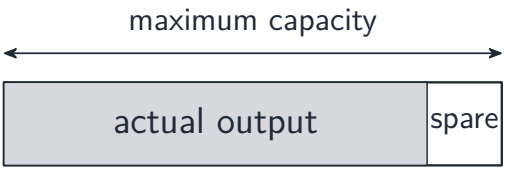
just-in-time

arrive as needed – low holding cost, high supplier risk

just-in-case

keep a buffer – safer against shocks, more cash tied up

Capacity utilisation



$$\text{utilisation} = \frac{\text{actual output}}{\text{maximum output}} \times 100\%.$$

Aim high but not full ($\sim$85–90%): low leaves idle resources; 100% leaves no time to repair.

Working below capacity

Under-utilisation	**Under-utilisation** 产能利用不足 means fixed costs are spread over fewer units, so the cost per unit rises.
Why it happens	Falling demand, seasonality, a bottleneck elsewhere, or capacity built for growth that has not arrived.
What to do	Cut capacity (redundancy, closure), or fill it – subcontract for another firm, add a product, market harder.
The other end	Running at 100% leaves no room for maintenance, no slack for a rush order, and tired staff.

Operations **add value** 增值 by turning inputs into something worth more – and idle capacity adds none while still costing.

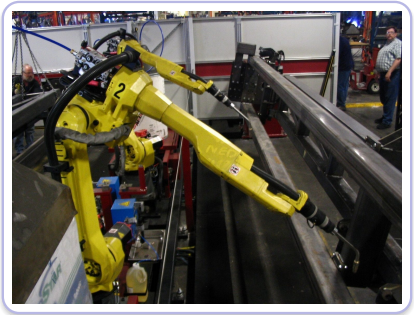
Outsourcing

Outsourcing 外包 pays another firm to do work you used to do (cleaning, IT, parts).

+ cheaper, focus, flexible

− less control, delays, secrets

Capital- and labour-intensive operations



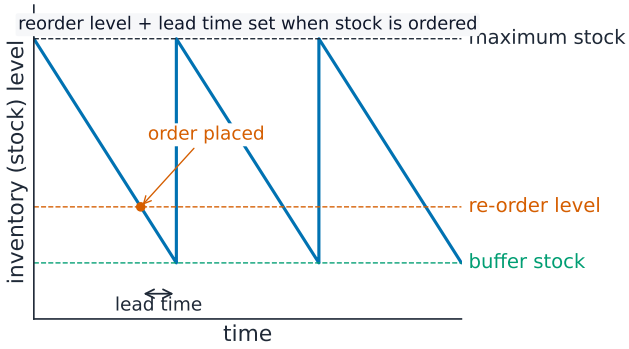
Factory robots: capital-intensive production uses more machines relative to labour

The production methods, and how full to run

labour-intensive 劳动密集型	mostly people – a hair salon. Flexible and good for personal service, but quality varies and wages dominate cost
capital-intensive 资本密集型	mostly machines – consistent and cheap per unit at volume, but a large fixed cost and little flexibility
job 单件生产 production	one unique item at a time
batch 批量生产 production	groups of identical items, with a changeover between batches
flow 流水线生产 production	a continuous line – lowest unit cost, highest set-up cost
mass customisation 大规模定制	a flow line that still lets customers choose options – cars with chosen colours and trim

Capacity utilisation 产能利用率: most firms aim for 85–90%. **Over-utilisation** 产能过度利用 leaves no time for repairs, tires staff and can lower quality.

Inventory control charts



Stock is used up, then replenished when a new order arrives after the lead time

Just-in-time and just-in-case



just-in-time (almost no stock)

just-in-case (extra buffer stock)

Just-in-time holds almost no stock (low cost, but risky if a delivery is late); just-in-case keeps a buffer (safer, but more to store)

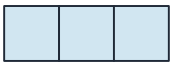
Job, batch and flow production compared

job



one unique item at a time

batch



a group, then switch to another

flow



a non-stop line

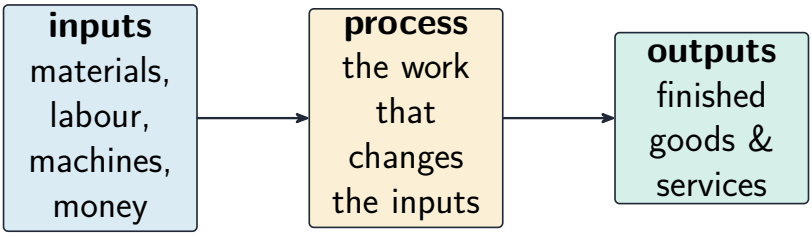
Job production is flexible but costly per unit; flow production has a low unit cost but needs high, steady demand; batch sits between.

Productivity and efficiency



Assembly line: productivity is output per worker (or per hour) – rising productivity cuts unit costs

What operations management does



the output is worth more than the inputs $\Rightarrow$ value added

> Operations turn inputs into outputs, adding value along the way

Exam tips

- Calculate **capacity utilisation** and **productivity**; high utilisation spreads fixed costs but leaves no slack for breakdowns or new orders.
- Read an **inventory control chart** (re-order level, lead time, buffer stock, maximum stock).
- Compare **JIT vs JIC** (low holding cost but delivery risk vs security of supply but higher cost).
- Match the **production method** (job, batch, flow) to the product and the size of the order.

3 Recap

Worked example – labour productivity

A factory of 20 workers makes 800 units in a day. Find the output per worker.

- Labour productivity $= \dfrac{\text{total output}}{\text{number of workers}}$
- $= \dfrac{800}{20} = 40$ units per worker per day
- Higher productivity cuts the labour cost per unit, so it improves competitiveness.
- Raise it by training, better capital, or motivation – not by simply hiring more.

Productivity is output per worker, not total output. Hiring more raises output but leaves productivity unchanged – that distinction earns marks.

Topic 4 – key takeaways

1 Operations

inputs → process → outputs; productivity

2 Production

job, batch, flow, mass customisation

3 Inventory

re-order level, buffer; JIT vs JIC

4 Capacity

utilisation; aim high not full

Check yourself

1. Which production method suits a one-off item?
2. What is buffer inventory for?
3. Main risk of just-in-time?
4. Capacity utilisation if output is 80 of 100?



Answers **1.** job production **2.** safety stock for delays/extra demand **3.** a late delivery stops production **4.** 80%