

Operations management (5.1-5.9)

International Baccalaureate · IB Diploma · Business Management · SL

Operations management

IB Diploma Programme Business Management SL, Unit 5 *Operations management* (first assessment 2024). This topic covers the SL content of sections 5.1 to 5.5: the role of operations, operations methods, location and break-even analysis. Lean production and quality (5.3), production planning (5.6), crisis management (5.7), research and development (5.8) and management information systems (5.9) are HL only and are left out. The worked examples use the course's repair business, and the numbers fit Unit 3: each repair sells for 25 on average, uses 15 of parts and direct labour, and fixed costs are 12,500 a month.

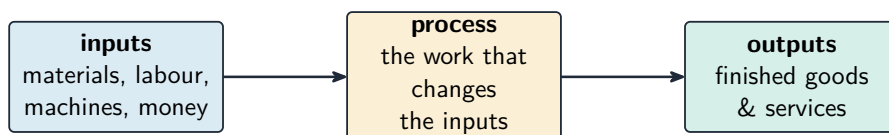
In March 2011 a huge earthquake and tsunami hit north-east Japan. Many of Toyota's suppliers stopped work. Toyota was famous for holding very little stock, so within days some of its factories in Japan and abroad had no parts, and output stayed low for months. Toyota did not give up its low-stock system. Instead it built a database of every supplier behind its suppliers, so it could act faster next time. This topic is about how a business makes its products: which production method to use, where to produce, and how many it must sell to cover its costs.

Must-know for this topic:

Idea	Key content
operations	inputs → process → outputs; links to finance, HR and marketing
methods	job, batch, mass/flow, mass customisation
location	reasons; outsourcing, offshoring, insourcing, reshoring
break-even	contribution 10; break-even 1,250 repairs; margin of safety 750

The role of operations and operations methods

Operations management is the part of a business that makes its goods or provides its services. It turns **inputs** (labour, materials, machines, money and information) into **outputs** that are worth more than the inputs. The extra value is **value added**.



the output is worth more than the inputs ⇒ value added

Inputs are transformed into outputs worth more than the inputs: value added

Operations links to every other part of the business. Marketing says what customers want; finance pays for the machines; human resources finds the skilled staff. Operations must also be sustainable: a workshop that recycles oil and old tyres cuts its costs and its harm to the environment.

There are four main **operations methods** :

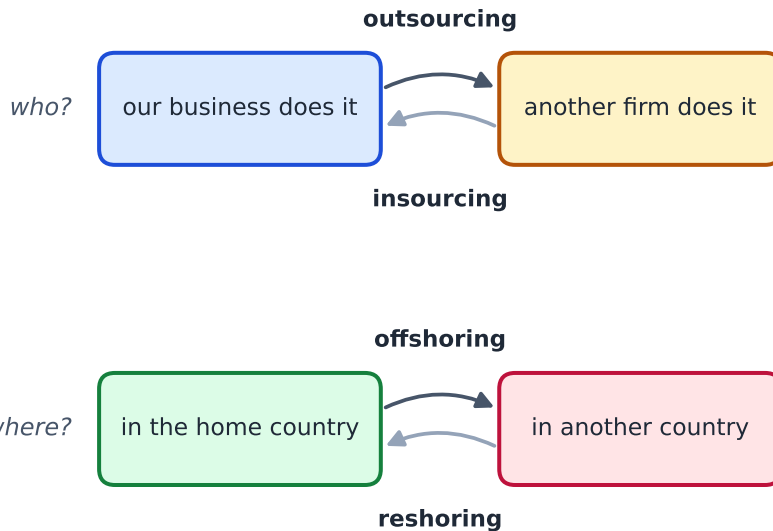
Method	What it is	Example	For and against
job production	one item made to a customer's order	restoring a classic car	high quality and high prices; slow, skilled staff, high cost per unit
batch production	a group of identical items, then a switch to the next group	servicing 40 taxis from one company in one week	some variety, lower cost; time is lost when switching between batches
mass production (flow)	the same item made without stopping	a car factory line	lowest cost per unit; expensive to set up, little choice, boring work
mass customisation	flow-line speed, but each customer chooses features	a car ordered online in your choice of colour and wheels	choice at a low cost; needs flexible machines and good data

Location

Businesses choose a location by weighing:

- costs: land, rent, wages and transport;
- the labour available and its skills;
- nearness to customers (most important for services, such as repairs) and to suppliers (important for heavy materials);
- infrastructure: roads, ports, power and internet;
- government: taxes, grants, rules and political stability;
- culture and language, for a business moving abroad.

A business can also change who does the work and where.



Outsourcing and insourcing change who does the work; offshoring and reshoring change where

- **Outsourcing** (subcontracting) gives a task to another firm, such as the repair business paying a firm to run its booking app. It is often cheaper and uses the other firm's skills, but the business loses some control over quality.
- **Offshoring** moves work to another country, for lower costs or to be near new markets.
- **Insourcing** brings an outsourced task back inside the business, usually for better control or quality.
- **Reshoring** brings work back to the home country, often after supply problems abroad.

Break-even analysis

Contribution per unit is the price minus the variable cost per unit. It is the amount each sale adds towards paying the fixed costs.

$$\text{contribution per unit} = 25 - 15 = 10$$

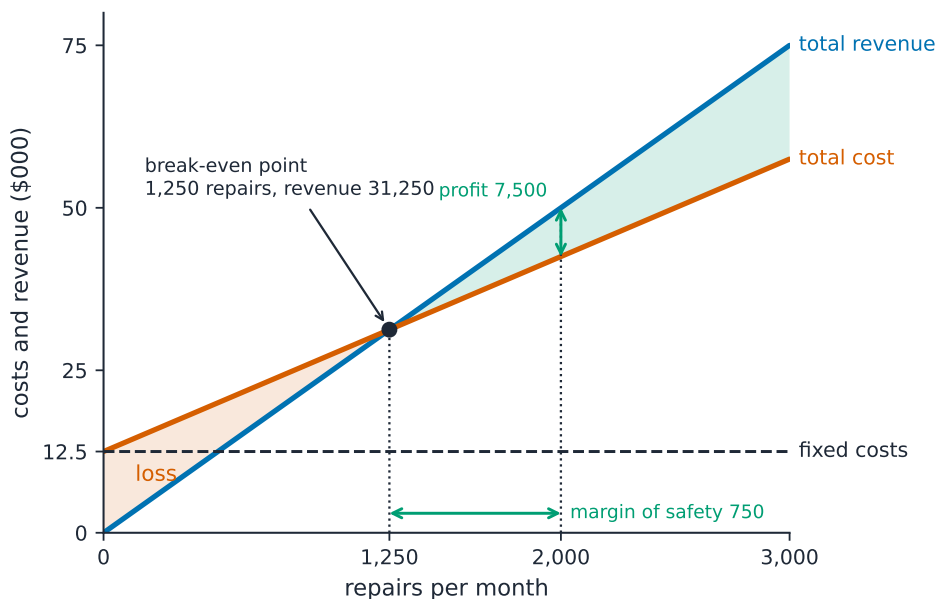
Total contribution is contribution per unit $\times$ output. At 2,000 repairs a month it is $2,000 \times 10 = 20,000$. Profit is total contribution minus fixed costs: $20,000 - 12,500 = 7,500$ a month.

The **break-even** output is where total revenue equals total cost, so there is no profit and no loss.

$$\text{break-even output} = \frac{\text{fixed costs}}{\text{contribution per unit}} = \frac{12,500}{10} = 1,250 \text{ repairs a month}$$

The **margin of safety** is how far sales can fall before the business makes a loss.

$$\text{margin of safety} = \text{actual output} - \text{break-even output} = 2,000 - 1,250 = 750 \text{ repairs}$$



Break-even at 1,250 repairs a month; at 2,000 repairs the margin of safety is 750 repairs

A business can also work out the output or price it needs for a **target profit** :

- target output = $\frac{\text{fixed costs} + \text{target profit}}{\text{contribution per unit}}$. For a profit of 15,000: $(12,500 + 15,000) \div 10 = 2,750$ repairs.
- target price = $\frac{\text{fixed costs} + \text{target profit}}{\text{output}} + \text{variable cost per unit}$. For a profit of 10,000 at 2,000 repairs: $(12,500 + 10,000) \div 2,000 + 15 = 26.25$.

Worked example: a change in price and cost. The business raises its price to 27, so contribution rises to 12. In the same month the rent rises by 3,000, so fixed costs become 15,500. The new break-even output is $15,500 \div 12 = 1,291.7$, which rounds up to 1,292 repairs. If sales stay at 2,000, profit rises to $2,000 \times 12 - 15,500 = 8,500$, but the margin of safety falls from 750 to 708. If the higher price drives some customers away, the business is closer to a loss than before.

Break-even analysis is quick and easy to show on a chart, and it helps when planning prices or a new product. But it assumes that every unit made is sold, that the price and the variable cost per unit stay the same at every output, and that fixed costs never change. In real life, buying in bulk lowers variable costs, a bigger output may need a new workshop, and sales forecasts can be wrong.

Checklist

- The transformation process and value added; links between operations and the other functions; sustainability (5.1).
- Job, batch, mass and mass customisation, with an example and the advantages and disadvantages of each (5.2).
- Location factors; outsourcing, offshoring, insourcing and reshoring (5.4).
- Contribution 10, total contribution 20,000, break-even 1,250 repairs, margin of safety 750, target output 2,750 for a profit of 15,000, target price 26.25; the change to price 27 and rent +3,000 (break-even 1,292, margin 708); the limits of the model (5.5).

Paper 2 tests the calculations: write the formula, put in the numbers and give the answer with its unit, then say what it means for the business. Paper 1 asks about operations methods, quality and location in the case-study business. All numbers here are original.