

Business Management Units 3 & 4

Chapter 7 — Introduction to operations management

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Chapter 7 Introduction to operations management — 7A Operations management and business objectives

Theory

Operations management is the management of the process by which a business transforms its resources into the goods and services it sells. Every business — whether it makes a physical product or delivers a service — takes in resources and converts them into something a customer will buy; operations management is the coordination of that conversion process. It is one of the key functional areas of a business (alongside areas such as human resources, marketing and finance), and it is the area **directly responsible for actually producing** what the business offers to the market. Because operations is where a business's resources are turned into the products that earn its revenue, how well operations is managed has a direct bearing on whether the business succeeds — the way operations is run flows through to every business objective.

Business objectives are the goals a business intends to achieve. The study design identifies objectives such as making a **profit**, increasing **market share**, improving **efficiency**, improving **effectiveness**, fulfilling a **market need**, fulfilling a **social need**, and meeting **shareholder expectations**. Two of these — efficiency and effectiveness — are so closely tied to operations that they are usually the first way operations management is judged.

- **Efficiency** describes **how well a business uses its resources** — how much output it generates from a given quantity of inputs, and how little time, money and material it wastes in doing so. An efficient operation produces its goods or services at the **lowest possible cost** and with the **least possible waste**. Efficiency is often summarised as *doing things right*.
- **Effectiveness** describes the **extent to which a business achieves what it set out to achieve** — whether its operation produces outputs that **meet its objectives and satisfy customer needs**. An effective operation delivers the **right good or service, of the right quality**, so that customers' expectations are met. Effectiveness is often summarised as *doing the right things*.

How operations management contributes to objectives. Effective operations management pursues efficiency and effectiveness together, and through them supports the business's wider objectives:

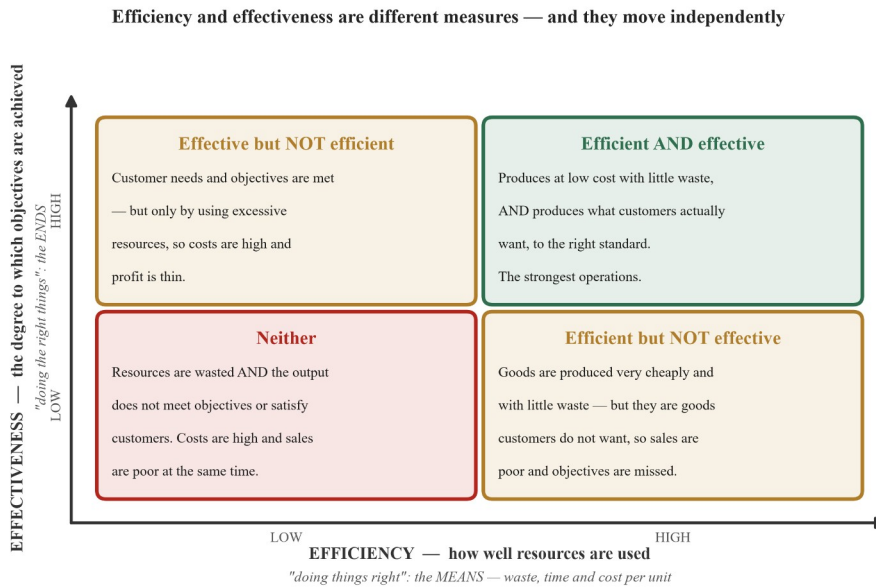
- **Profit.** Efficient operations lower the cost of producing each unit (less waste, less wasted time, lower input cost per unit). Effective operations produce goods and services that customers actually want, supporting sales revenue. Lower costs combined with strong revenue widen the gap between revenue and expenses — that is, they increase profit.
- **Competitiveness.** A business that produces efficiently can afford to charge competitive prices; a business that produces effectively offers quality and features rivals struggle to match. Both make the business more competitive.
- **Market share.** By producing quality outputs that meet customer needs (effectiveness) at prices kept low by efficient production (efficiency), a business attracts and retains customers, increasing its share of the total market.
- **Fulfilling a market or social need.** Operations is the function that physically creates the good or service; without it, a business could not deliver the product that meets the need it exists to serve.
- **Meeting shareholder expectations.** Because efficient, effective operations underpin profit and growth, they help the business meet the returns its owners and shareholders expect.

In short, operations management is the engine room in which resources become saleable products, so managing it well — efficiently and effectively — is a precondition for achieving almost every other objective the business holds.

Efficiency versus effectiveness. These two terms are constantly confused, and the distinction is one of the most heavily examined ideas in operations. They measure **different things**:

- Efficiency is about the **means** — *how well resources are used* (waste, time and cost). Effectiveness is about the **ends** — *whether the intended outcome is achieved* (objectives met, customer needs satisfied).
- They can move **independently**. A business can be **efficient but not effective** — for example, producing goods very cheaply and with little waste, but goods that customers do not want, so sales are poor. It can also

be **effective but not efficient** — meeting customer needs and objectives, but only by using excessive resources, so costs are high and profit is thin. The strongest operations are **both** efficient and effective.



Key ideas to keep straight.

- **Efficiency is not effectiveness.** Efficiency concerns *how resources are used* (minimising waste and cost); effectiveness concerns *whether the goal is reached* (meeting objectives and customer needs). One is about the means, the other about the ends. Write about them **separately**, not as a single combined idea.
- **Efficiency is not simply “productivity”.** Productivity is one narrow measure (output per unit of input); efficiency is the broader idea of obtaining outputs with the least waste and cost. Do not treat “being efficient” as identical to “being productive”.
- **Effectiveness is not “how well the product works”.** Effectiveness is the degree to which the **business** achieves its objectives and meets customer needs — not a description of how a product performs.
- **Operations management is not itself an objective** — it is the *function* that helps the business *reach* its objectives. Keep the function (managing the transformation process) distinct from the goals it serves (profit, market share and so on).
- A well-managed business pursues **both** efficiency and effectiveness; being strong on one does not guarantee the other.

Contemporary example — Ego Pharmaceuticals, July 2025

Ego Pharmaceuticals is an Australian skincare and pharmaceutical manufacturer with production at Braeside, in Melbourne’s south-east.

On 1 July 2025 the business launched a \$156 million, decade-long expansion of its Braeside operations, covering a new research facility (the Zorzi Innovation Centre), an additional cream filling line, expanded warehousing and a sustainability program it calls Green Core. Ego stated that the expansion would double its annual production capacity — which had exceeded 33 million units in 2024 — and create 90 jobs across its Braeside and Dandenong South sites, and reported that its carbon emissions per kilogram of product had fallen 32% since 2019.

The announcement is a clear illustration of operations working as a **function in the service of business objectives** rather than as an objective in its own right. The new filling line and the added capacity are changes to the **transformation process** — how inputs become finished product — made so that the business can supply the volume customers are seeking; that is a question of **effectiveness** and of **fulfilling a market need**, and through it of **market share**. Cutting emissions per kilogram produced is a measure of **resource use per unit of output**, and therefore of **efficiency**, while also serving a **social need**.

Worked examples

Example 1 — scaffolded

Define operations management and explain how effective operations management can contribute to a business’s objective of making a profit.

Working	Comment
Operations management is the management of the process that transforms a business’s inputs (resources) into the outputs — the goods and services — it sells.	Begin with an accurate two-part definition: what is managed (the process) and what that process does (transforms inputs into outputs).
Effective operations management improves efficiency — using resources with less waste, time and cost — which lowers the cost of producing each unit.	Identify the first mechanism: efficiency reduces costs.
It also improves effectiveness — producing goods and services that meet customer needs — which supports sales and therefore revenue.	Identify the second mechanism: effectiveness supports revenue.
Lower production costs together with stronger sales revenue widen the gap between revenue and expenses, which increases profit.	Connect the mechanisms to the objective: profit = revenue – expenses.
∴ by making operations more efficient and more effective, operations management directly supports the objective of making a profit.	State the conclusion, linking back to the objective.

Example 2 — scaffolded

Aurora Soapworks makes handmade soap. It recently changed its production method so that it uses 20% less oil per bar, while the soap still lasts as long and smells as customers expect. Explain whether this is an improvement in efficiency or effectiveness, and how it could help Aurora achieve its objectives.

Working	Comment
Using 20% less oil per bar means Aurora is using fewer resources to produce the same output , with less waste.	Read the change against the definitions: less input per unit is a resource-use issue.
This is an improvement in efficiency — the same soap is now produced at a lower material cost per bar.	Classify correctly: efficiency is about resource use and cost, not about meeting customer needs.
Because the soap still lasts as long and smells as customers expect, effectiveness is maintained — customer needs are still being met.	Note the improvement is not achieved at the expense of quality; effectiveness has not fallen.
Lower cost per bar reduces Aurora’s total production costs, which (with sales unchanged) increases profit and lets it price more competitively.	Link the efficiency gain to the wider objectives (profit, competitiveness).

Example 3 — unscaffolded

Distinguish between efficiency and effectiveness in relation to operations management.

Efficiency refers to **how well a business uses its resources** in its operations — how much output it obtains from its inputs and how little time, money and material it wastes; an efficient operation produces at the **lowest possible cost** and is often described as *doing things right*. **Effectiveness** refers to **the degree to which the operation achieves the business’s objectives and meets customer needs** — producing the right good or service, of the right quality; it is often described as *doing the right things*. The key difference is what each measures: efficiency is about the **means** (resource use and cost), whereas effectiveness is about the **ends** (whether the intended outcome is achieved). The two are independent, so a business can be strong on one and weak on the other — cheap production of goods nobody

wants is efficient but not effective. ∴ efficiency and effectiveness describe two different dimensions of operations, and a well-managed business pursues both.

Example 4 — unscaffolded

Analyse the relationship between effective operations management and the achievement of business objectives.

Operations management is the function that transforms a business's inputs into the goods and services it sells, so it sits at the centre of how well the business meets its objectives. When operations is managed **effectively**, it produces outputs that meet customer needs and expectations; this satisfies customers, which supports sales, helps the business **fulfil the market need** it exists to serve, and draws customers away from rivals, increasing **market share**. When operations is managed **efficiently**, resources are used with less waste and cost, so the **cost of producing each unit falls**. These two effects reinforce one another: lower costs and stronger, more loyal customer demand together widen the gap between revenue and expenses, raising **profit**, which in turn helps the business **meet shareholder expectations**. The relationship therefore runs in one direction — the standard of operations management is the **cause**, and the achievement of objectives is the **effect**: improving the efficiency and effectiveness of operations flows through to profit, competitiveness and market share. ∴ effective operations management is not an objective in itself but a key driver of nearly every other objective a business holds.

Practice questions

Scaffolded

- Q1.** Define the term *operations management*.
- Q2.** Explain the difference between an operation that is **efficient** and an operation that is **effective**.
- Q3.** For each of the following, state whether it is an example of improving **efficiency** or **effectiveness**: (a) reducing the amount of raw material wasted on a production line; (b) redesigning a product so that it better meets customer expectations; (c) lowering the average cost of producing each unit.
- Q4.** Identify **three** business objectives that effective operations management can help a business to achieve.
- Q5.** A juice bar changes its recipe so that it wastes less fruit per drink, while the taste of the drink remains the same. (a) Identify whether this is an improvement in efficiency or effectiveness. (b) Explain how this change could contribute to the business's objective of making a profit.
- Q6.** Explain why operations management is described as a **function** that helps a business reach its objectives, rather than as a business objective in its own right.

Unscaffolded

- Q7.** Define the term *business objectives*. (2 marks)
- Q8.** Distinguish between *efficiency* and *effectiveness*. (4 marks)
- Q9.** Describe the relationship between operations management and the achievement of business objectives. (3 marks)
- Q10.** Explain how improving the **efficiency** of operations can contribute to a business's objective of making a profit. (4 marks)
- Q11.** Explain how **effective** operations management can help a business to fulfil a market need. (3 marks)
- Q12.** Using an example, explain how a business could be **efficient but not effective**. (4 marks)
- Q13.** Compare **efficiency** and **effectiveness** in relation to operations management. (4 marks)
- Q14.** *Case study.* **Pedal & Post** is a small business that assembles cargo bicycles. Last quarter it cut the number of bolts and offcuts wasted per bike by improving how components are laid out for its assemblers, and the finished bikes are unchanged in quality. (a) Identify whether Pedal & Post has improved the **efficiency** or the **effectiveness** of its

operations. (1 mark) (b) Explain how this improvement could help Pedal & Post achieve **one** business objective. (3 marks)

Q15. Justify the view that operations management is central to a business achieving its objectives. (4 marks)

Q16. Analyse how improving both the **efficiency** and the **effectiveness** of operations can contribute to a business's **competitiveness** and **market share**. (6 marks)

Q17. Evaluate the view that, for achieving business objectives, the **effectiveness** of operations matters more than its **efficiency**. (6 marks)

Q18. A business is losing money because its products are cheap to make but sell poorly. Propose whether it should focus first on improving the **efficiency** or the **effectiveness** of its operations, and justify your choice. (4 marks)

Q19. *Case study — extended response.* **Lumen Lighting** designs and manufactures LED light fittings. Its managers want to lift profit and win back market share from cheaper overseas competitors, but the business currently wastes a large amount of aluminium in production and has received complaints that some fittings do not match what customers expected. Analyse the relationship between operations management and the achievement of business objectives at Lumen Lighting. (10 marks)

Q20. *Contemporary example.* In July 2025, **Ego Pharmaceuticals** launched a \$156 million expansion of its Braeside operations, stating that it would double the site's annual production capacity and create 90 jobs, and reporting that its carbon emissions per kilogram of product had fallen 32% since 2019. Analyse how this operations investment could contribute to Ego's achievement of its business objectives. (6 marks)

Answers

Q1. The management of the process that transforms a business's inputs (resources) into the outputs — the goods and services — it sells. **Q2.** An efficient operation uses its resources well — producing with the least waste, time and cost (*doing things right*); an effective operation achieves the business's objectives and meets customer needs (*doing the right things*). The difference is means versus ends. **Q3.** (a) efficiency; (b) effectiveness; (c) efficiency. **Q4.** Any three of: profit; market share; efficiency; effectiveness; fulfilling a market need; fulfilling a social need; meeting shareholder expectations (competitiveness is also acceptable). **Q5.** (a) Efficiency. (b) Less fruit wasted per drink lowers the ingredient cost per drink, so with sales unchanged, expenses fall and profit rises. **Q6.** Operations management is the function that manages the transformation of inputs into outputs; the objectives (profit, market share, improved efficiency and effectiveness, meeting a market need) are the goals the business is trying to reach. Managing operations well is the means by which those goals are achieved, so it drives the objectives rather than being one of them. **Q7.** Model response in solutions. **Q8.** Efficiency = resource use and cost (the means); effectiveness = achieving objectives / meeting needs (the ends). See solutions. **Q9.** Operations turns inputs into saleable outputs, so how well it is run — its efficiency and effectiveness — determines whether objectives are met. See solutions. **Q10.** Efficiency lowers cost per unit → lower expenses → (revenue held constant) higher profit. See solutions. **Q11.** Effective operations produce the right good/service to meet what customers want, so the market need is fulfilled. See solutions. **Q12.** e.g. cheaply, low-waste production of a product customers do not want — efficient but not effective (needs/sales objective unmet). See solutions. **Q13.** Similarity: both measure operations performance / both are objectives pursued together. Difference: efficiency = resource use and cost; effectiveness = meeting objectives and customer needs. See solutions. **Q14.** (a) Efficiency. (b) e.g. less waste → lower cost per bike → higher profit (or a more competitive price). See solutions. **Q15.** Operations creates the saleable product, so its efficiency and effectiveness drive nearly every objective — profit, competitiveness, market share. See solutions. **Q16.** Efficiency → lower costs → competitive prices; effectiveness → quality that meets needs → attracts/retains customers; both lift competitiveness and market share, and reinforce each other. See solutions. **Q17.** Two-sided: effectiveness arguably the logical priority (no sales if needs unmet) but efficiency needed to turn sales into profit; judgement that both are required and the emphasis is situational. See solutions. **Q18.** Focus on effectiveness first — products sell poorly, so customer needs are unmet; making an unwanted product cheaper would not fix sales. See solutions. **Q19.** Model response in solutions. **Q20.** Added capacity / new filling line → operation can supply the volume customers want → effectiveness → fulfils the market need → market share; lower emissions per kg = less resource used per unit of output → efficiency → lower cost per unit → profit (and a social need served); operations is the function serving the objectives, not an objective itself. See solutions.

Fully-worked solutions

Q7. (2 marks) **Business objectives** are the **goals a business intends to achieve** — the specific outcomes it sets out to accomplish, and the standard against which its performance is judged. Examples include making a **profit**, increasing **market share**, improving **efficiency** and **effectiveness**, fulfilling a **market need** or a **social need**, and meeting **shareholder expectations**. (1 mark for identifying objectives as the goals or outcomes the business sets out to achieve; 1 mark for a second accurate element — that they give the business direction and a standard for measuring its performance, or the naming of valid examples.)

Q8. (4 marks) **Efficiency** refers to **how well a business uses its resources** in its operations — obtaining the most output from its inputs while minimising the time, money and material wasted; an efficient operation produces at the **lowest possible cost per unit** and is described as *doing things right*. **Effectiveness** refers to **the extent to which the operation achieves the business's objectives and meets customer needs** — producing the right good or service, of the right quality; it is described as *doing the right things*. The key distinction is that efficiency measures the **means** (resource use and cost) while effectiveness measures the **ends** (whether the intended outcome is achieved). (1 mark each for an accurate account of efficiency and of effectiveness; further marks for clearly drawing out the means-versus-ends difference and treating the two terms separately rather than combining them.)

Q9. (3 marks) Operations management is the function that **converts a business's inputs into the goods and services it sells**, so it stands between the resources a business holds and the products that earn its revenue. Because of this position, **how well operations is managed determines how well the business meets its objectives**: managing operations **efficiently** keeps production costs and waste low, while managing it **effectively** produces outputs that meet customer needs. Together these outcomes feed directly into objectives such as profit, market share and

competitiveness. (Marks for: identifying operations as the transformation function; linking the standard of operations management to objective achievement; naming efficiency and effectiveness as the channels through which this works.)

Q10. (4 marks) Improving the efficiency of operations means the business **uses fewer resources, less time and less material to produce each unit**, which **reduces the cost of producing each unit** and therefore lowers total production costs. Since **profit is the difference between revenue and expenses**, reducing production expenses — with revenue held constant — **widens that gap and increases profit**. Greater efficiency can also allow the business to lower its selling price to win more sales, or to keep the saving as a higher margin on each unit. (1 mark efficiency = less waste/cost per unit; 1 mark lower unit cost → lower expenses; 1 mark profit = revenue – expenses; 1 mark causal conclusion that profit rises.)

Q11. (3 marks) A market need is a good or service that customers in the market want but that is not yet adequately supplied. **Effective operations management produces the right good or service, of the right quality, to satisfy what those customers want**. By ensuring the output genuinely matches customer expectations, the business supplies the product the market was seeking and therefore **fulfils the market need** — whereas an operation that produced the wrong product, or poor quality, would leave the need unmet. (Marks for: what a market need is; effectiveness = producing outputs that meet customer needs; the causal link from meeting needs to fulfilling the market need.)

Q12. (4 marks) A business is **efficient** when it produces with little waste at low cost, and **effective** when its output meets customer needs and the business's objectives — and these are **independent**. For example, a phone-case maker might streamline its production so that each case is made very cheaply with almost no wasted plastic (high **efficiency**), but if the cases are an unpopular shape that customers do not want to buy, the business is **not effective**, because it is not meeting customer needs or its sales objective. It is producing the wrong thing very well. This shows that efficiency alone does not guarantee effectiveness. (1 mark efficiency shown; 1 mark effectiveness shown; 1 mark a valid example that separates the two; 1 mark explicit explanation of why the business is efficient but not effective.)

Q13. (4 marks) Efficiency and effectiveness are **similar** in that both are measures of how well a business's operations are performing, both are business objectives in their own right, and effective operations management pursues **both** at once to help achieve the business's wider goals. They **differ** in what they measure: **efficiency** is about the **means** — how well resources are used, judged by waste and cost per unit (*doing things right*) — whereas **effectiveness** is about the **ends** — whether the operation achieves its objectives and meets customer needs (*doing the right things*). A further difference is that a business can rate highly on one and poorly on the other, since the two dimensions are independent. (Must give BOTH at least one similarity AND at least one difference — a one-sided answer caps at half marks; award for accurate content on each term.)

Q14. (4 marks) (a) **Efficiency.** (1 mark.) (b) By cutting the bolts and offcuts wasted on each bike while quality is unchanged, Pedal & Post **uses fewer materials to build each bike, lowering its cost per unit**. With quality — and therefore sales — unaffected, the **fall in production costs increases the business's profit** (or lets it price its cargo bikes more competitively to win more customers). (Award for: correct link from reduced waste to lower unit cost; naming a specific objective — e.g. profit / competitiveness / market share; a genuine explanation applied to Pedal & Post, not merely naming the business.)

Q15. (4 marks) Operations management **should be regarded as central** to achieving business objectives because it is the function that **actually produces the goods and services the business sells** — without it there is nothing to sell and no revenue. Managing operations well delivers the two outcomes most objectives depend on: **efficiency**, which lowers costs and so **directly raises profit** and allows competitive pricing, and **effectiveness**, which produces outputs that meet customer needs and so **builds sales, market share and the fulfilment of the market need**. Because profit, competitiveness and market share all trace back to how resources are transformed into products, the standard of operations management is a **decisive influence** on whether those objectives are met — which justifies calling it central. (Justify requires reasoning that argues the case, not just description: reward the explicit “why it is central” argument backed by the efficiency/effectiveness → objectives chain.)

Q16. (6 marks) Improving the **efficiency** of operations means producing with less waste and a lower cost per unit. This **lowers the price a business needs to charge to make a profit**, so it can offer more competitive prices; cheaper, competitively priced products **draw customers away from rivals**, which **raises market share** and strengthens **competitiveness** on price. Improving the **effectiveness** of operations means producing outputs that better **meet customer needs and expectations** — higher quality, or features customers value. This makes the product **more attractive than competitors' offerings**, so the business **wins and retains more customers**, again lifting market

share and making it **more competitive on quality**. The two effects **reinforce each other**: a product that is both well-priced (from efficiency) and well-matched to customer needs (from effectiveness) is far harder for rivals to beat than one that is only cheap or only high-quality, so the combined gain in competitiveness and market share is greater than either improvement alone. (*Analyse = show causal chains, NOT a list of pros and cons. Reward: efficiency → lower cost → competitive price → market share; effectiveness → meets needs → attracts customers → market share; and the interaction between the two. Marked globally.*)

Q17. (6 marks) There is a strong case that **effectiveness matters more**: if operations do not produce goods and services that meet customer needs, customers will not buy them, so the business earns no revenue no matter how cheaply it produces — an efficient operation making the wrong product simply produces waste very cheaply. On this view, effectiveness must come first because it secures the sales on which every other objective depends. **However**, efficiency cannot be dismissed. Even a business that meets customer needs will **fail to make a profit if its costs are too high**, and uncompetitive prices from poor efficiency can lose it market share to leaner rivals; efficiency is what converts sales into sustainable profit and shareholder returns. The two are ultimately **interdependent** — effectiveness with no efficiency yields sales but no profit, while efficiency with no effectiveness yields low costs but no sales. **On balance**, effectiveness is arguably the **logical priority**, because meeting customer needs is a precondition for having any sales to make efficient; but it is **not simply “more important”** — a well-managed business must achieve both, and which to emphasise depends on the situation (a business with unsold products should fix effectiveness first, whereas one that is selling well but losing money should target efficiency). (*Evaluate requires a supported judgement, not “it depends” alone. Reward a genuine two-sided argument plus a reasoned conclusion; do not reward double-dipping — using the same point as both sides.*)

Q18. (4 marks) The business should focus first on improving the **effectiveness** of its operations. The problem stated is that its products are **cheap to make but sell poorly** — that is, the operation is already **efficient** (low production cost) but **not effective**, because the output is not meeting customer needs, which is why sales are weak. Improving efficiency further would only make an unwanted product even cheaper, without fixing the reason it is not selling. By instead making operations more effective — producing goods that match what customers actually want, in the right quality — the business can **lift sales and revenue**, the necessary first step to stemming its losses and eventually returning to profit. (*Propose = recommend AND justify: award for the correct recommendation and, more importantly, the reasoning that diagnoses the business as efficient-but-not-effective and explains why effectiveness is the right focus.*)

Q19. (10 marks) — model response. Operations management is the **management of the process that transforms a business’s inputs into the goods and services it sells**. For Lumen Lighting, this is the function that turns aluminium and other resources into finished LED light fittings, so it sits directly between the business’s resources and the products that earn its revenue — which is why how well Lumen manages its operations largely determines whether it meets its objectives of lifting profit and winning back market share.

Lumen’s operations are currently **weak on efficiency**. Efficiency is how well a business uses its resources — producing with the least waste and the lowest cost per unit — and Lumen is **wasting a large amount of aluminium** in production. This wasted material raises the cost of producing each fitting, which **increases expenses and erodes profit**, and leaves Lumen with **higher unit costs than its cheaper overseas competitors**, undermining its ability to compete on price and defend its market share. If Lumen managed its operations more efficiently and reduced this waste, its **cost per fitting would fall**; since profit is the difference between revenue and expenses, **lower production costs would directly increase profit**, and the saving could allow more competitive pricing against overseas rivals — helping to win back **market share**.

Lumen’s operations are also **weak on effectiveness**. Effectiveness is the extent to which operations produce outputs that meet customer needs and the business’s objectives, and Lumen has received **complaints that some fittings do not match what customers expected** — a sign that the operation is not consistently producing the right product to the right standard. This directly threatens Lumen’s objectives: dissatisfied customers are less likely to buy again and may switch to competitors, **reducing sales and market share**, and unmet expectations mean Lumen is not fulfilling the market need it exists to serve. If Lumen managed operations more effectively, so that fittings reliably met customer expectations, it would **satisfy and retain customers, attract new ones from rivals and rebuild market share**, while the stronger sales would also support profit.

Crucially, these two dimensions **work together**. Efficiency and effectiveness are distinct — one concerns how resources are used (cost and waste), the other whether customer needs and objectives are met — and Lumen needs

both: reducing aluminium waste without fixing quality would only make disappointing fittings cheaper, while improving quality without controlling waste would meet customer needs but leave Lumen uncompetitive on cost against overseas rivals. Only by improving efficiency **and** effectiveness together can Lumen lower its costs, lift the quality customers experience, and so raise **profit** and win back **market share** at the same time.

In relationship terms, the standard of operations management is the **cause** and the achievement of Lumen's objectives is the **effect**: because operations is where Lumen's resources become saleable fittings, improving how efficiently and effectively that transformation is managed flows directly through to profit, competitiveness and market share. Operations management is therefore not a goal in itself for Lumen but the **central driver** of the objectives its managers are trying to reach.

(Full marks require: an accurate definition of operations management applied to Lumen; separate, accurate treatment of efficiency and effectiveness (not blurred together); clear causal links from each to Lumen's stated objectives of profit and market share; recognition that the two dimensions interact; sustained application to Lumen throughout; and a conclusion framing operations management as the driver of objective achievement. Marked globally.)

Q20. (6 marks) Operations management is the function that **transforms Ego's inputs into the finished products it sells**, so a change to that process flows through to the objectives the business is trying to reach. The **new cream filling line and the doubling of production capacity** are changes to the **transformation process** that allow Ego to produce more of what customers want. This supports **effectiveness**, because the operation is able to supply the right product in the quantity the market is seeking; meeting that demand helps Ego **fulfil the market need** it exists to serve and, by satisfying customers who might otherwise buy from rivals, supports its **market share**. The reported **32% fall in carbon emissions per kilogram of product** is a measure of **resource use per unit of output** — obtaining the same quantity of product while consuming less — and is therefore an improvement in **efficiency**. Using fewer resources per unit **lowers the cost of producing each unit**, and since **profit is the difference between revenue and expenses**, lower unit costs with revenue at least maintained **increase profit** and allow more competitive pricing; reducing emissions also contributes to a **social need**. These effects reinforce one another: producing a greater volume, and producing it with less resource used per unit, means both more units sold and a wider margin on each, so the gain to profit is larger than either change would deliver alone. ∴ the investment is not itself an objective but a change to the operations **function**, undertaken to advance the objectives of profit, market share, fulfilling a market need and fulfilling a social need. *(Analyse = trace causal chains from the operations change to named objectives, NOT a list of the investment's features. Reward: capacity / filling line → effectiveness → market need and market share; emissions per kg → efficiency → lower unit cost → profit; recognition that operations is the function serving objectives rather than an objective in its own right. Marked globally.)*

Chapter 7 Introduction to operations management — 7B Characteristics of operations management in manufacturing and service businesses

Theory

Operations management is concerned with the way a business transforms its resources into the goods and services it sells. The way those operations are run, however, is not the same for every business, because businesses produce fundamentally different kinds of output. The study design distinguishes two broad types. A **manufacturing business** produces **tangible goods** — physical items such as furniture, canned food, bicycles or ovens that can be seen, touched and owned. A **service business** produces **intangible services** — an act, performance or experience such as legal advice, a haircut, a ferry trip or a dental check-up that cannot be physically held. This single difference in output — tangible versus intangible — sets off a chain of further differences in *how* operations are managed.

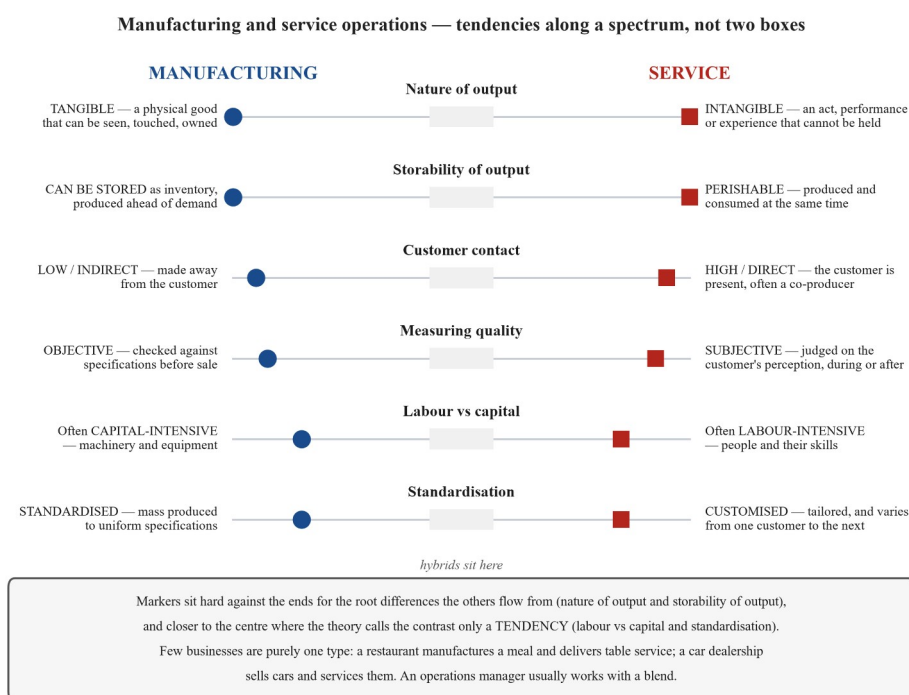
The characteristics below are the ones used to contrast manufacturing and service operations. They are **tendencies**, **not absolute rules**: real businesses sit along a spectrum, and many have elements of both.

- **Nature of output (tangibility).** Manufacturing produces a **tangible** physical good; a service is **intangible** — the customer receives an outcome or experience rather than an object. A customer can inspect a table before buying it, but cannot hold a lawyer's advice or a bus ride in their hands.
- **Storability of output.** Because a physical good is tangible, it **can be produced ahead of demand and stored as inventory** until it is sold, so production can be separated in time and place from consumption. A service is **perishable**: it generally **cannot be stored** and is **produced and consumed at the same time**. An unsold seat on tonight's ferry, an empty appointment slot or an unbooked hotel room is lost forever and cannot be shelved for later. This makes matching supply to changing demand harder for a service business.
- **Customer contact.** Manufacturing typically involves **low or indirect** customer contact — goods are made in a factory, often far from the buyer, who is not present while they are produced. A service typically involves **high, direct** contact — the customer is frequently **present and takes part** in producing the service (sitting in the salon chair, describing symptoms to the physiotherapist), so the process is more visible and the customer is often a co-producer of the outcome.
- **Labour versus capital intensity.** Manufacturing is often **capital-intensive**: production leans heavily on machinery, equipment and automated lines, so a large share of the resources used is capital. A service is often **labour-intensive**: it leans heavily on **people** and their skills and interaction with the customer. (This is a tendency only — some services, such as telecommunications, are highly capital-intensive, and some manufacturing is labour-intensive.)
- **Standardisation versus customisation.** Manufactured output tends to be **standardised** — mass produced to uniform specifications so that each unit is essentially identical. Service output tends to be more **customised and variable** — tailored to the individual customer and delivered by different employees at different times, so the output differs from one instance to the next. Consistency is therefore easier to achieve in manufacturing than in a service.
- **Measuring quality.** In manufacturing, quality is comparatively **easy and objective** to measure — output can be checked against **physical specifications and tolerances** (dimensions, weight, strength, defect counts) **before** it reaches the customer, and defective units can be identified and removed. In a service, quality is more **subjective and difficult** to measure — it depends on the customer's **perception and experience** (timeliness, courtesy, the result), and because the service is produced and consumed simultaneously there is **no chance to inspect and correct it before delivery**; quality is often judged during or after the service, through customer feedback.

Many businesses are hybrids. Few businesses are purely one type. A restaurant *manufactures* a meal (a tangible good) but also delivers *table service* (an intangible service); a car dealership sells cars (goods) and also services and repairs them (a service); a café produces coffee (a good) within a service experience. Operations managers therefore usually manage a **blend** of these characteristics rather than a pure case of one or the other.

The characteristics can be summarised as a direct comparison.

Characteristic	Manufacturing operations	Service operations
Nature of output (tangibility)	A tangible physical good that can be seen, touched and owned	An intangible service — an act, performance or experience that cannot be physically held
Storability of output	Output can be stored as inventory and produced ahead of demand	Output is perishable — it cannot be stored and is usually produced and consumed at the same time
Customer contact	Usually low / indirect — goods are made away from the customer	Usually high / direct — the customer is often present and helps produce the service
Labour vs capital intensity	Often capital-intensive — relies heavily on machinery and equipment	Often labour-intensive — relies heavily on employees and their skills
Standardisation vs customisation	Output tends to be standardised and uniform across units	Output tends to be customised and varies from one customer to the next
Measuring quality	Comparatively easy and objective — checked against physical specifications before sale	More subjective and difficult — based on the customer's perception and judged during or after delivery



In the figure above each characteristic is drawn as a **spectrum** rather than a pair of boxes, and the two markers sit **hard against the ends** only for the root differences the others flow from — *nature of output* and *storability*. For **labour versus capital** and **standardisation versus customisation** the markers are drawn nearer the centre, because the theory treats those two as tendencies with real exceptions. The shaded band in the middle is where the **hybrids** sit.

Key ideas to keep straight.

- **Tangible versus intangible** is the root difference; most of the others (storability, contact and how quality is measured) flow from it.
- **Storable versus perishable**. A good can be made now and sold later; a service is consumed as it is produced, so it cannot be stockpiled.
- **Low versus high customer contact**. Manufacturing keeps the customer out of the factory; a service usually needs the customer present, often as a co-producer.
- The characteristics describe **typical tendencies**, not laws — the labour/capital and standardisation contrasts in particular have exceptions.

- **Many businesses are hybrids**, producing both a good and a service, so an operations manager often works with a mix of these characteristics.

Contemporary example — ResMed, August 2025

ResMed Inc. is a medical device and health-software business with Australian origins — its Australian subsidiary was organised in 1989 — supplying sleep and breathing products internationally.

On **8 August 2025**, ResMed lodged its annual report (Form 10-K) with the United States Securities and Exchange Commission for the **financial year ended 30 June 2025**. That report named **Sydney, Australia** among the company's main manufacturing facilities, and separated net revenue into **devices** (about 52 per cent), **masks and other accessories** (about 36 per cent) and **Residential Care Software** (about 12 per cent). Residential Care Software was reported as one of the company's two operating segments, the other being Sleep and Breathing Health.

That split shows this subtopic inside a single set of accounts. Devices and masks are **tangible** goods: they are produced in a factory away from the patient, so customer contact is **low and indirect**; production is **capital-intensive**; the output is **standardised** and can be checked against **physical specifications** before dispatch; and it **can be stored as inventory**. The software segment sells an **intangible** service that is delivered and consumed as customers use it, so it **cannot be produced ahead of demand and stored**, and its quality is judged largely on the customer's **perception** of the service received. ResMed is therefore a **hybrid**, with the manufacturing/service line drawn by its own segment reporting.

Source: ResMed Inc. (U.S. Securities and Exchange Commission, EDGAR), Annual Report on Form 10-K for the fiscal year ended 30 June 2025, 8 August 2025 — <https://www.sec.gov/Archives/edgar/data/943819/000094381925000035/rmd-20250630.htm>. Accurate as at July 2026.

Worked examples

Example 1 — scaffolded

Redgum Timberworks makes hardwood dining tables in a workshop and sells them through retailers. **Aria Hair Studio** cuts and styles clients' hair by appointment. For each business, identify whether it is primarily a manufacturing or a service business and describe **one** characteristic of its operations that supports your answer.

Working	Comment
Redgum Timberworks produces a tangible physical good (a table) that is made in a workshop and can be stored and sold later → manufacturing .	Start from the nature of the output: tangible good = manufacturing.
A supporting characteristic: its output can be stored as inventory , so tables can be produced ahead of demand and held until sold.	Choose one characteristic and tie it to the business.
Aria Hair Studio produces an intangible service (a haircut) that the client is present for → service .	Intangible act performed for a present customer = service.
A supporting characteristic: the service involves high, direct customer contact — the client is in the chair while it is produced and cannot store the haircut for later.	Link a service characteristic to the business.
∴ Redgum is a manufacturing business and Aria is a service business, distinguished by the tangibility and storability of their output.	State the conclusion.

Example 2 — scaffolded

Harbourline Ferries operates passenger ferries across a harbour. Explain why Harbourline cannot store its output as inventory, and identify **one** operational challenge this creates.

Working	Comment
Harbourline's output is an intangible service — a ferry trip — that is produced and consumed at the same time (the trip happens as passengers travel).	Identify the output and its intangible, simultaneous nature.
Because the service is perishable, a seat that is empty on a departure is lost forever — it cannot be stored and sold on a later, busier sailing.	Explain perishability with a concrete example.
One challenge: Harbourline must match its capacity to demand as it occurs , because it cannot build up a stock of trips in quiet periods to draw on at peak times.	Draw out one operational consequence.

Example 3 — unscaffolded

Distinguish between the output of a manufacturing business and the output of a service business.

The output of a **manufacturing** business is a **tangible good** — a physical item, such as a loaf of bread or a bicycle, that can be seen, touched and owned, and that **can be produced ahead of time and stored** as inventory until it is sold. The output of a **service** business is an **intangible service** — an act, performance or experience, such as financial advice or a bus trip, that **cannot be physically held** and is generally **produced and consumed at the same time**, so it cannot be stored. The two therefore differ in both the **tangibility** of what is produced and in whether that output **can be stored**. ∴ manufacturing output is a storable physical good, whereas service output is a perishable, intangible act.

Example 4 — unscaffolded

Compare the level of customer contact in manufacturing operations with that in service operations.

In **both** manufacturing and service operations the customer's needs ultimately shape what is produced, and both types of business must satisfy the customer to succeed, so neither can ignore the customer. The operations **differ**, however, in **how much direct contact** the customer has with the production process. In **manufacturing**, contact is typically **low and indirect**: goods are made in a factory, often well before and far away from the point of sale, and the customer is **not present** while the good is produced. In a **service**, contact is typically **high and direct**: the customer is frequently **present and participates** in producing the service — for example, a client describing what they want to a hairdresser — which makes the process more visible and the customer part of it. ∴ while both are driven by customer needs, service operations involve far more direct customer contact during production than manufacturing operations do.

Practice questions

Scaffolded

- Q1. Define the term *service business* as it is used in operations management.
- Q2. List **four** characteristics that are used to contrast manufacturing operations with service operations.
- Q3. For each of the following, identify whether it typically describes a **manufacturing** or a **service** business: (a) the output can be stored as inventory; (b) the customer is usually present while the output is produced; (c) the output is intangible; (d) production relies heavily on machinery and is capital-intensive.
- Q4. Identify **one** business that has **both** manufacturing and service elements, and state one good and one service that it provides.
- Q5. **Meadowbrook Dental** provides dental check-ups and treatments to patients. (a) Identify whether Meadowbrook's output is tangible or intangible. (b) Explain why Meadowbrook cannot store its output as inventory.
- Q6. Explain the difference in the **level of customer contact** between a manufacturing business and a service business.

Unscaffolded

- Q7. Describe **one** characteristic that distinguishes manufacturing operations from service operations. (2 marks)

- Q8.** Distinguish between the output of a manufacturing business and the output of a service business. (4 marks)
- Q9.** Explain why the output of a service business is often described as **perishable**. (3 marks)
- Q10.** Explain why measuring quality is typically **more difficult** in a service business than in a manufacturing business. (4 marks)
- Q11.** Compare manufacturing operations and service operations in terms of the **level of customer contact** and the **storability of output**. (6 marks)
- Q12.** Analyse how the **intangibility** of a service affects the way an operations manager is able to measure its quality. (6 marks)
- Q13.** Explain the difference between a **labour-intensive** and a **capital-intensive** operation, using a service and a manufacturing example. (4 marks)
- Q14.** Explain why the output of a manufacturing business is generally **more standardised** than the output of a service business. (3 marks)
- Q15. Case study. Ironbark Furniture Co** manufactures flat-pack bookshelves. Timber is cut, drilled and packed on an automated line in a large factory, and finished packs are stored in a warehouse before being dispatched to hardware retailers. Customers never visit the factory. (a) Identify Ironbark's output and state whether it can be stored as inventory. (2 marks) (b) Explain the level of customer contact in Ironbark's operations. (3 marks) (c) Analyse how the tangible nature of Ironbark's output affects the way it can measure the quality of its bookshelves. (4 marks)
- Q16. Case study. Summit Physiotherapy** is a clinic where physiotherapists treat clients in one-on-one appointments. Each treatment plan is tailored to the individual client's injury. (a) Explain why Summit's output is described as intangible and perishable. (3 marks) (b) Explain why Summit's output is more **customised** than the output of a typical manufacturing business. (3 marks)
- Q17.** Evaluate the view that a business is *either* a manufacturer *or* a service provider, but not both. (6 marks)
- Q18. Case study. Vista Motors** sells new cars from a showroom and also runs a workshop that services and repairs vehicles. Analyse how the characteristics of Vista's operations differ between the showroom (selling cars) and the workshop (servicing cars). (6 marks)
- Q19. Extended response.** "Service operations are more difficult to manage than manufacturing operations." Discuss this statement, referring to the characteristics of operations management in manufacturing and service businesses. (10 marks)
- Q20.** In its annual report for the financial year ended 30 June 2025, **ResMed** reported revenue from devices and from masks and other accessories separately from the revenue of its Residential Care Software segment. Analyse how the characteristics of operations management differ between these two parts of the business. (6 marks)
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Answers

Q1. A business whose main output is an intangible service — an act, performance or experience provided for customers — rather than a physical good. **Q2.** Any four of: nature of output (tangibility); storability of output; level of customer contact; labour vs capital intensity; standardisation vs customisation; ease of measuring quality. **Q3.** (a) manufacturing; (b) service; (c) service; (d) manufacturing. **Q4.** Any valid hybrid, e.g. a **restaurant** — good: the meal it cooks; service: table service/waiting on customers. (Also acceptable: café, car dealership with a service centre, bakery-café.) **Q5.** (a) Intangible. (b) The check-up is a service produced and consumed at the same time (while the patient is in the chair), so it cannot be made in advance and stored. **Q6.** Manufacturing = low/indirect contact (customer not present in the factory); service = high/direct contact (customer usually present and taking part). **Q7.** Model response in solutions (e.g. tangible vs intangible output). **Q8.** Manufacturing = tangible, storable good; service = intangible, perishable act. See solutions. **Q9.** A service is produced and consumed simultaneously and cannot be stored, so unused capacity is lost. See solutions. **Q10.** Service quality is subjective/perception-based and cannot be inspected before delivery; goods are checked against physical specifications. See solutions. **Q11.** Similarity: both driven by customer needs / both transform inputs to satisfy customers. Difference: contact low vs high; output storable vs perishable. See solutions. **Q12.** Intangibility → no physical specification to inspect and no product to check before delivery → quality judged by customer perception and feedback. See solutions. **Q13.** Labour-intensive = relies on people (service example); capital-intensive = relies on machinery (manufacturing example). See solutions. **Q14.** Manufacturing mass-produces uniform units to set specifications; services are tailored and vary by employee and occasion. See solutions. **Q15.** (a) Flat-pack bookshelves (a tangible good); yes, they can be stored. (b) Low/indirect — customers never visit the factory. (c) Tangible output can be checked against physical specifications before dispatch. See solutions. **Q16.** (a) Intangible act, produced and consumed together, cannot be stored. (b) Each plan is tailored to the individual client, so output varies. See solutions. **Q17.** Reject the view overall — many businesses are hybrids with both goods and services. See solutions. **Q18.** Showroom (selling cars) = tangible, storable, standardised, lower contact; workshop (servicing) = intangible, perishable, customised, higher contact. See solutions. **Q19.** Model response in solutions. **Q20.** Devices/masks = tangible, storable, standardised, capital-intensive, low contact, quality checked against physical specifications; Residential Care Software = intangible service, cannot be stored, delivered as it is used, quality judged on customer perception. One hybrid business running both. See solutions.

Fully-worked solutions

Q7. One distinguishing characteristic is the **tangibility of the output**. A manufacturing business produces a **tangible** physical good — an item such as a bicycle that can be seen, touched and owned — whereas a service business produces an **intangible** service, an act or experience that cannot be physically held. This difference in what is produced is the starting point for most of the other differences between the two types of operation.

Q8. The output of a **manufacturing** business is a **tangible good** — a physical item, such as canned food, that can be seen, touched and owned, and that **can be produced ahead of demand and stored** as inventory until it is sold. The output of a **service** business is an **intangible service** — an act or experience, such as a haircut or legal advice, that **cannot be physically held** and is generally **produced and consumed at the same time**, so it cannot be stored. The two outputs therefore differ in both their **tangibility** (physical good vs intangible act) and their **storability** (storable vs perishable).

Q9. A service is described as **perishable** because it is **intangible** and is **produced and consumed at the same time**, which means it **cannot be stored** for later use. Unlike a physical good, which can be made now and kept in a warehouse until it is sold, a service exists only at the moment it is delivered. As a result, any **unused capacity is lost forever** — an empty seat on a ferry, an unbooked appointment or a vacant hotel room on a given night cannot be saved and sold later. This is why perishability forces service businesses to try to match their capacity closely to demand as it occurs.

Q10. Measuring quality is **more difficult in a service** for two related reasons. First, a service is **intangible** and depends on the customer's **perception and experience** — factors such as courtesy, timeliness and the outcome — which are **subjective** and vary from customer to customer, so there is no single physical specification to measure the service against. Second, because a service is **produced and consumed at the same time**, there is **no opportunity to inspect and correct it before it reaches the customer**; the customer experiences any fault as it happens. A **manufactured good**, by contrast, is **tangible** and can be checked against **objective physical specifications**

(dimensions, weight, defect counts) and defective units removed **before** they are sold. Service quality is therefore usually judged after the event, through customer feedback, rather than measured objectively in advance.

Q11. Similarity: in **both** manufacturing and service operations the process is ultimately driven by **satisfying customer needs**, and both types of business transform inputs into an output that must meet those needs, so neither can ignore the customer. **Differences:** the operations differ in the **level of customer contact** and in the **storability of output**. In manufacturing, customer contact is **low and indirect** — goods are produced in a factory, away from the customer, who is not present during production — whereas in a service contact is **high and direct**, with the customer usually present and often taking part in producing the service. In manufacturing, output **can be stored** as inventory and made ahead of demand, whereas a service is **perishable** and cannot be stored, being produced and consumed at the same time. In short, both are shaped by customer needs, but service operations involve much higher customer contact and produce an output that cannot be stored.

Q12. The **intangibility** of a service has a direct effect on how its quality can be measured. Because the service has **no physical form**, there is **no set of physical specifications or tolerances** (such as size, weight or defect count) that the operations manager can inspect the output against, as they could with a manufactured good. Intangibility also means the service is **experienced by the customer**, so its quality is judged largely on **subjective perceptions** — how prompt, courteous and effective the service felt — which differ from one customer to another. Furthermore, because an intangible service is **produced and consumed at the same moment**, the manager **cannot check the output and fix faults before it reaches the customer**; any shortfall is experienced directly. As a result of these linked effects, the manager is pushed towards measuring quality **indirectly and after the event** — through customer feedback, complaints and satisfaction surveys — rather than through the objective, up-front inspection possible in manufacturing. The intangibility of the service therefore both **removes the physical yardstick** for quality and **shifts the timing** of measurement to after delivery.

Q13. A **labour-intensive** operation is one in which production relies mainly on the **work of people and their skills**, so labour makes up a large share of the resources used. A **capital-intensive** operation is one in which production relies mainly on **machinery, equipment and technology**, so capital makes up a large share of the resources used. Service operations tend to be more labour-intensive — for example, a **physiotherapy clinic** depends chiefly on its physiotherapists to deliver treatments — while manufacturing operations tend to be more capital-intensive — for example, a **cannery** depends chiefly on its automated filling and sealing machinery to produce output. (These are tendencies: some services are capital-intensive and some manufacturing is labour-intensive.)

Q14. Manufacturing output is generally **more standardised** because goods are **mass produced to fixed specifications**, often on machinery or an automated line, so each unit is made the same way and is essentially **identical** to the next. A service, by contrast, is usually **delivered by people directly to individual customers**, so it is **tailored to each customer's needs** and varies with **who provides it and when**. Because human delivery and individual requirements introduce variation, service output is harder to keep uniform, whereas machine-based, specification-driven manufacturing achieves consistency more easily.

Q15. (a) Ironbark's output is **flat-pack bookshelves**, which are a **tangible physical good**. Yes — because they are tangible, they **can be stored as inventory** (finished packs are held in the warehouse before dispatch). (b) Ironbark's operations involve **low, indirect customer contact**. The bookshelves are made on an automated line in a large factory that **customers never visit**, and they reach customers only later, through hardware retailers, so buyers are **not present while the good is produced** and have no direct contact with the production process. (c) Because Ironbark's output is a **tangible good**, its quality can be measured **objectively and before it reaches the customer**. Each bookshelf can be checked against **physical specifications** — correct dimensions, all holes drilled, panels undamaged, the right components in each pack — and any **defective packs identified and removed** in the warehouse before dispatch. The tangible nature of the output therefore lets Ironbark inspect quality up front against a clear physical standard, rather than having to rely on customer perceptions after the sale.

Q16. (a) Summit's output is a **physiotherapy treatment**, which is **intangible** — the client receives a treatment and an outcome (an act and experience) rather than a physical object they can hold. It is **perishable** because it is **produced and consumed at the same time**, during the appointment, and so **cannot be stored**: an appointment slot that is not booked is lost and cannot be saved for later. (b) Summit's output is more **customised** than a typical manufacturer's because each **treatment plan is tailored to the individual client's injury** and is delivered in a one-on-one appointment by a physiotherapist. This means the service **varies from client to client** (and with which physiotherapist

provides it), whereas a manufacturer mass-produces **uniform, standardised units** to a fixed specification. Summit's output is therefore individual and variable rather than identical and repeatable.

Q17. The view should be **largely rejected**. It is true that some businesses are clearly at one end: a cannery is essentially a **manufacturer** (a tangible, storable good made in a factory), and a law firm is essentially a **service** provider (an intangible, perishable service). To that extent the distinction is useful. **However**, the claim is **too rigid**, because **many businesses are hybrids that produce both a good and a service**. A **restaurant**, for example, *manufactures* a meal (a tangible good) but also provides *table service* (an intangible service); a **car dealership** sells cars (goods) and also services them (a service). For such businesses the operations manager must handle a **blend** of characteristics — a storable, standardised good *and* a perishable, high-contact, customised service — at the same time. ∴ while the manufacturing/service distinction is a useful description of a business's *dominant* output, it is inaccurate to insist a business must be purely one or the other, since hybrids that combine both are common.

Q18. The two parts of Vista's operations differ across most of the standard characteristics. **Selling cars in the showroom** is essentially a **manufacturing-type** output: the car is a **tangible good** that **can be stored** as inventory in the showroom, is **standardised** (each model built to the same specification), and involves relatively **lower contact** with the production process, since the customer buys a finished product they did not help make. **Servicing and repairing cars in the workshop** is essentially a **service-type** output: the service is **intangible** (the work done on the vehicle), is **perishable** (a booked mechanic's hour that goes unused is lost and cannot be stored), is **customised** to each vehicle's condition, and involves **higher, more direct contact**, as the customer brings the car in, explains the problem and often waits or is consulted. The relationship is therefore that a **single business runs two operations with opposite characteristics side by side** — a tangible, storable, standardised good and an intangible, perishable, customised service — so Vista's operations manager must manage both sets of characteristics at once.

Q19. Model response (10 marks). Whether service operations are harder to manage than manufacturing operations depends on the characteristics that distinguish the two. A **manufacturing** business produces a **tangible good** (for example, **Coastline Cannery** producing tinned soup), while a **service** business produces an **intangible service** (for example, **Cloudpeak Accounting** preparing tax returns). Several characteristics do make **service operations harder to manage**. Because a service is **intangible and perishable**, it **cannot be stored**, so a business like Cloudpeak cannot build up a stock of output in quiet periods and must instead **match its capacity to demand as it happens** — an empty appointment or an idle hour is lost forever. Because services involve **high, direct customer contact** and are **customised** to each client, output **varies from one job and one employee to the next**, making **consistency harder to achieve**. And because a service is **produced and consumed at the same time** and judged on **subjective customer perceptions**, its **quality cannot be inspected and corrected before it reaches the customer**, so faults are experienced directly and are harder to control. On these grounds, the statement has real merit.

However, the statement is **too one-sided**, because **manufacturing operations carry their own management challenges**. Coastline Cannery must invest in and maintain **expensive, capital-intensive machinery**, coordinate the **storage, handling and financing of inventory** (which can be spoiled, damaged or left unsold), and manage complex supply chains for physical inputs — difficulties a service business largely avoids. Standardised mass production also demands tight control so that large volumes of output meet exact specifications. Moreover, the difficulty is not fixed: some services are **highly standardised and low-contact** (and so relatively easy to run), and many businesses are **hybrids** — a restaurant both manufactures meals and serves them — so a manager may face both sets of challenges at once. ∴ on balance, service operations do tend to be harder to manage in the specific senses that their output cannot be stored, is highly customised and cannot be checked for quality before delivery; but the claim overstates the case, because manufacturing brings its own significant challenges of capital, inventory and standardised quality control, and the real difficulty depends on the particular business rather than simply on whether it makes a good or provides a service. *(Full marks require: an account of the relevant characteristics of both manufacturing and service operations; a genuine two-sided discussion of why services can be harder to manage and why manufacturing also poses challenges; use of manufacturing and service examples; and a sustained conclusion that weighs both sides.)*

Q20. The two parts of ResMed's reported revenue sit at opposite ends of the characteristics used to contrast manufacturing and service operations. The **devices, masks and other accessories** are a **manufacturing** output: they are **tangible** physical goods, made in factories — the annual report for the year ended 30 June 2025 listed Sydney among the company's main manufacturing sites — so **customer contact is low and indirect**, since the patient is **not present** while the mask is produced. Because that output is tangible it **can be stored as inventory** and produced **ahead of demand**, it is **standardised** to a fixed specification so units are essentially identical, production is

comparatively **capital-intensive**, and quality can be measured **objectively against physical specifications** (dimensions, seal, defect counts) and faulty units removed **before** they reach the customer. The **Residential Care Software** revenue is a **service** output: what the customer receives is **intangible** — access, support and maintenance rather than an object that can be held — and it is **delivered and consumed as it is used**, so it is **perishable** and **cannot be produced in advance and stockpiled**. It is delivered **directly to the customer**, so contact is **higher and ongoing**; it is **customised** to how each customer uses it; and its quality is judged largely on the customer's **subjective perception** of reliability and support, after the event, rather than inspected up front. The significance is that a **single business** runs both sets of characteristics side by side: ResMed is a **hybrid**, and its operations managers must simultaneously handle a storable, standardised and specification-tested good alongside an intangible, perishable, perception-judged service. ∴ the characteristics do not describe two different kinds of business here so much as two different operations within one, which is exactly why the manufacturing/service contrast is best read as a set of **tendencies** rather than a rule.

Chapter 7 Introduction to operations management — 7C Key elements of an operations system

Theory

Every business runs an **operations system** — the arrangement by which it takes in resources and converts them into the goods or services it sells. The operations system is best understood as a **transformation process**: resources enter the business, work is done on them to change their form, condition or location, and finished goods or services emerge for the customer. The study design divides this system into **three key elements** — **inputs, processes and outputs** — which follow one another in a continuous flow from the resources the business gathers to the product it delivers.

The operations system: transforming resources into goods and services



The processes add value by changing the inputs' form, condition or location

Inputs. Inputs are the **resources a business gathers and uses** in the transformation process — the things that go *into* production. They are commonly grouped as:

- **Raw materials** — the physical materials that are worked on or built into the product, such as flour and yeast for a baker, timber and steel for a furniture maker, or fabric for a clothing manufacturer.
- **Labour** — the physical and mental effort, skills and knowledge that employees contribute, such as machine operators, chefs, nurses or consultants.
- **Capital / equipment** — the machinery, tools, technology and facilities used to carry out production, such as ovens, robotic arms, computers, delivery vehicles or a factory building.
- **Information** — the data and knowledge that guide production, such as customer orders, product designs and specifications, demand forecasts and quality standards.

Processes. Processes are the **transformation activities** — the sequence of actions that **convert inputs into outputs**. They are the “doing” part of the system, and are best described with **verbs**: mixing, cutting, moulding, welding, assembling and packaging in a factory; or diagnosing, advising, transporting and serving in a service business. Processing is what actually **adds value** — it changes the inputs’ **form** (raw flour into a baked loaf), **condition** (an unwell patient into a treated one) or **location** (goods moved from a warehouse to a customer’s door).

Outputs. Outputs are the **finished goods or services** that result from the transformation process and are **delivered to customers**. In a **manufacturing** business the output is a **tangible good** — a car, a loaf of bread, a pair of shoes. In a **service** business the output is an **intangible service** — a haircut, a medical consultation, a completed flight. A well-run operations system produces outputs that meet customer expectations for quality, quantity and timing.

How the three elements fit together. The elements form a single chain: inputs are gathered, processes act on them, and outputs emerge for the customer. They are **interdependent** — the quality and quantity of the inputs limit what the processes can achieve, and the effectiveness of the processes determines the quality of the output. A joinery that buys warped timber, or that assembles good timber carelessly, will produce a poor table either way; strength in one element does not make up for weakness in another. Managing an operations system therefore means managing all three elements together.

Key ideas to keep straight.

- **Inputs are not outputs.** Inputs are the resources that enter *before* transformation; outputs are the finished goods or services that emerge *after* it. The same item is never both — flour is an input, bread is the output.

- **A process is not an output.** The process is the **activity** (the transforming — “baking”, “assembling”); the output is the **result** (the thing produced — “bread”, “an assembled car”). Confusing the activity with the result is a common error.
- **Outputs can be goods or services.** The three-element system applies equally to a factory (tangible goods) and to a service business (intangible services); an output does not have to be a physical product.
- **Technology and equipment are inputs, not processes.** Machinery, robotics and software are **capital inputs** that a business *uses* to carry out its processes — they are resources, not the transformation activity itself. Classifying equipment as a “process” is a frequent mistake.

Contemporary example — Mars Wrigley Australia, April 2023

Mars Wrigley Australia is a confectionery manufacturer whose Australian operations include a chocolate factory at Ballarat in Victoria.

On **17 April 2023** the business announced a further **\$28.8 million** for **equipment upgrades** at that factory, building on more than \$67 million invested there since 2021. The announcement followed the arrival on Australian shelves, from 10 April 2023, of Mars, Snickers and Milky Way bars in **paper-based wrappers** developed through more than \$2.5 million of research and trials at the Ballarat site. The business expected the change to remove more than 360 tonnes of plastic from its value chain.

All three key elements appear in the one announcement. The wrapping material is a **raw material**, and the trial results and packaging specifications are **information** — both **inputs**. The machinery the \$28.8 million pays for is **capital/equipment**, which is also an **input**, not a process. The **processes** are the transformation activities that machinery carries out: moulding and cooling the bars, then **wrapping** and packing them. The **outputs** are the finished wrapped bars — **tangible goods** delivered to retailers. The case also shows the elements are **interdependent**: changing one input (paper rather than plastic film) meant the capital inputs had to change with it, because equipment set up to wrap in film could not carry out the wrapping process on the new material and still produce a saleable output.

Source: Food & Beverage Industry News, “Mars Wrigley invests \$28.8 million in local manufacturing”, 17 April 2023 — <https://www.foodmag.com.au/mars-wrigley-invests-28-8-million-in-local-manufacturing/>. Accurate as at July 2026.

Worked examples

Example 1 — scaffolded

Golden Crust Bakery produces sourdough loaves that it sells to cafés. Identify **one input**, **one process** and **one output** for Golden Crust Bakery, and explain how they form a transformation process.

Working	Comment
Input: flour (a raw material); process: kneading and baking the dough; output: finished sourdough loaves.	Pick one clear item for each element — a resource that goes in, an activity, and a finished good.
These fit together as a transformation process: the flour (input) is changed in form by the kneading and baking (process) into loaves (output).	Explain the link — the process converts the input into the output by changing its form.
The loaves are the finished good delivered to the café customers, completing the system.	Confirm the output is what reaches the customer.
∴ Golden Crust’s operations system transforms the input (flour) through its processes (kneading, baking) into its output (sourdough loaves).	State the conclusion, naming all three elements.

Example 2 — scaffolded

Willow Lane Salon is a hair salon. Identify the inputs, processes and outputs of the salon, and explain how its processes add value for its clients.

Inputs: shampoo and dye (materials), hairdressers (labour), chairs, scissors and dryers (capital/equipment), and the client's booking and requests (information).

List an example from each input category — a service business still draws on all four.

Processes: consulting the client, washing, cutting, colouring and styling the hair.

Describe the processes as activities (verbs) performed on the client.

Output: the finished haircut or hairstyle — an intangible service delivered to the client.

Name the output and note it is a service, not a physical good.

Adding value: the processes change the **condition** of the client's hair, from unstyled to cut, coloured and styled. Shampoo and dye sitting on a shelf are worth little to the client; it is the hairdresser's work on them that creates the result the client pays for.

Link the processes back to value-adding — the transformation, not the resources, is what the customer buys.

Example 3 — unscaffolded

Distinguish between the inputs and the outputs of an operations system.

Inputs are the **resources a business gathers and uses** in the transformation process — the things that enter the system *before* transformation, such as raw materials, labour, capital/equipment and information. **Outputs** are the **finished goods or services** that emerge *after* the transformation process and are **delivered to customers**. The key difference is their **place in the system and their form**: inputs are unprocessed resources going *in*, while outputs are the completed products coming *out*. For example, in a furniture factory the timber, machinery and workers are inputs, whereas the finished table is the output. ∴ inputs are what the system consumes to produce, and outputs are what the system produces for the customer.

Example 4 — unscaffolded

A student writes that “the ovens a bakery uses are part of its processes”. Explain why this classification is incorrect.

The ovens are a form of **capital/equipment**, which is an **input**, not a process. Inputs are the **resources** a business *uses* in production, and equipment such as ovens, mixers and machinery are resources the bakery draws on. The **processes** are the **transformation activities** carried out *with* those resources — in this case the mixing, kneading and **baking**. The oven is therefore a tool that *enables* the process of baking; it is not the activity itself. Confusing equipment with a process mistakes a resource for the work done with it. ∴ the ovens are a capital input, while “baking” is the process, so the student has classified the element incorrectly.

Practice questions

Scaffolded

Q1. Define the term *operations system*.

Q2. List the three key elements of an operations system.

Q3. For each of the following, name the element of the operations system being described: (a) the finished goods or services delivered to customers; (b) the raw materials, labour, capital and information used in production; (c) the transformation activities that convert resources into finished products.

Q4. Classify each of the following as an input, a process or an output for a car manufacturer: (a) steel sheeting; (b) welding the body panels together; (c) a completed car.

Q5. A pizza shop makes and sells pizzas. (a) Identify **one** input and **one** process for the pizza shop. (b) Identify the output of the pizza shop.

Q6. Explain the difference between a *process* and an *output*.

Un scaffolded

Q7. Define the term *operations system*. (2 marks)

Q8. Describe **one** key element of an operations system. (2 marks)

Q9. Distinguish between the inputs and the outputs of an operations system. (4 marks)

Q10. Explain the role of the processes element in an operations system, referring to how it adds value. (3 marks)

Q11. Explain the role of the outputs element in an operations system. (3 marks)

Q12. Distinguish between **raw materials** and **capital/equipment** as inputs in an operations system, using an example of each. (4 marks)

Q13. Case study. Meadowlark Candles is a business that hand-pours scented candles for gift shops. (a) Identify **two** inputs Meadowlark Candles would use. (2 marks) (b) Describe **one** process Meadowlark Candles would carry out to make its candles. (2 marks) (c) Identify Meadowlark Candles' **output** and explain how its processes add value to its inputs. (4 marks)

Q14. Distinguish between the **processes** and the **outputs** of an operations system, using an example of each. (4 marks)

Q15. Analyse the relationship between the three key elements of an operations system. (6 marks)

Q16. A trainee at a café describes the espresso machines as part of the café's "processes". Explain why this classification is incorrect. (3 marks)

Q17. Explain how a business could use **information** as an input in its operations system. (3 marks)

Q18. Case study. Tidewater Ferries operates passenger ferries across a bay. Identify **one** input, **one** process and **one** output for Tidewater Ferries, and explain how these three elements work together as a transformation process. (6 marks)

Q19. Extended response. Choose an original manufacturing business of your own. For that business, map its operations system by identifying its inputs, processes and outputs, and explain how the three elements work together as a transformation process that adds value for its customers. (10 marks)

Q20. Contemporary example. In April 2023 **Mars Wrigley Australia** announced a further \$28.8 million for equipment upgrades at its Ballarat chocolate factory, after bars in newly developed paper-based wrappers reached Australian shelves. Analyse how a change of this kind affects the three key elements of a manufacturer's operations system. (6 marks)

Answers

Q1. The system by which a business transforms inputs (resources) into outputs (finished goods and services) for its customers. **Q2.** Inputs; processes; outputs. **Q3.** (a) outputs; (b) inputs; (c) processes. **Q4.** (a) input; (b) process; (c) output. **Q5.** (a) e.g. input = flour/cheese/dough (a raw material), or the pizza oven (capital); process = kneading, topping or baking. (b) The finished pizza. **Q6.** A process is the transformation **activity** (e.g. baking); an output is the **result** of that activity (e.g. the pizza). **Q7.** Model response in solutions. **Q8.** Any one element (input / process / output) defined with an example. See solutions. **Q9.** Inputs = resources going in before transformation; outputs = finished goods/services coming out after it. See solutions. **Q10.** Processes = the transformation activities that convert inputs into outputs and add value by changing form/condition/location. See solutions. **Q11.** Outputs = the finished goods/services delivered to customers; the end point of the system and the point at which it is judged against customer expectations. See solutions. **Q12.** Raw materials = physical materials worked on or built into the product, consumed in making it; capital/equipment = machinery, tools and facilities used to carry out production and reused. See solutions. **Q13.** (a) e.g. wax, wicks, fragrance (raw materials); moulds and pouring jugs (capital/equipment); candle-makers (labour). (b) e.g. melting the wax and pouring it into moulds. (c) Output = the finished scented candles; the processes change the wax's form into something gift shops will buy. See solutions. **Q14.** Processes = the transformation activities carried out on the inputs (verbs, e.g. stitching); outputs = the finished goods or services that result (e.g. the finished shirt). See solutions. **Q15.** Analyse how inputs feed the processes that produce the outputs — a causal chain in which each element limits what the next can achieve. See solutions. **Q16.** Espresso machines are capital (an input); the process is the activity of making the coffee. See solutions. **Q17.** Information (e.g. orders, designs, forecasts) guides what and how much is produced. See solutions. **Q18.** Input (e.g. fuel), process (transporting passengers), output (a completed ferry trip), plus an explanation of the processes changing the passengers' location to create that output. See solutions. **Q19.** Model response in solutions. **Q20.** Classify the elements — the wrapping material as a raw material input and the new machinery as capital/equipment (an input, not a process); wrapping and packing as processes; the finished wrapped bars as the tangible output. Then analyse the interdependence: a change to one input forces a matching change in the capital input, or the processes cannot produce a saleable output. See solutions.

Fully-worked solutions

Q7. An **operations system** is the system by which a business **transforms inputs (resources) into outputs (finished goods and services)**. It converts resources such as raw materials, labour, capital and information into the goods or services delivered to customers, and is often described as a transformation process made up of inputs, processes and outputs.

Q8. (*Any one element, described with an example.*) **Inputs** are the **resources a business gathers and uses** in the transformation process, such as raw materials, labour, capital/equipment and information — for example, the flour, bakers and ovens used by a bakery. (*Alternatively: **processes** are the transformation activities, such as mixing and baking, that convert inputs into outputs; or **outputs** are the finished goods or services delivered to customers, such as the loaves the bakery sells.*)

Q9. **Inputs** are the **resources that enter the system before transformation** — raw materials, labour, capital/equipment and information that the business gathers to use in production. **Outputs** are the **finished goods or services that emerge after transformation** and are delivered to customers. The two elements therefore differ in their **position in the system and their form**: inputs are unprocessed resources going *into* production, whereas outputs are the completed products coming *out*. For example, in a shoe factory the leather, machinery and workers are inputs, while the finished pair of shoes is the output.

Q10. The **processes** element is the set of **transformation activities that convert inputs into outputs** — for example mixing, cutting, assembling or, in a service, advising and serving. Its role is to **add value**: the processing **changes the form, condition or location** of the inputs so that they become something customers are willing to pay for. Without processing, the business would simply hold a collection of unconverted resources; it is the processes that turn those resources into a finished good or service, which is why this element is central to the operations system.

Q11. The **outputs** element is the **finished goods or services that emerge from the transformation process and are delivered to customers**. Its role is to be the **end point of the system** — the reason the inputs were gathered and the processes carried out in the first place. Because the outputs are what the customer actually receives and pays for, they

are also the point at which the operations system is judged: outputs that meet customer expectations for **quality, quantity and timing** earn sales and repeat custom, while outputs that fall short do not. For example, a bakery's loaves are its outputs; its flour and ovens are of value to the business only because the processes turn them into bread that customers will buy.

Q12. Raw materials are the **physical materials that are worked on or built into the product** during production; they enter the system and are **used up** as they become part of the finished output. **Capital/equipment** is the **machinery, tools, technology and facilities the business uses to carry out production**; it is *used* in the transformation but is **not** built into the product, and it remains available for the next unit. For example, in a bakery the **flour is a raw material** (it becomes the loaf), while the **oven is capital/equipment** (it bakes the loaf but is still there for tomorrow's batch). Both are inputs, but they differ in whether the resource is **converted into the output** or is a **durable resource used to convert it**.

Q13. (a) (*Any two.*) Wax and wicks (raw materials); candle-makers (labour); pouring jugs and moulds (capital/equipment); or customer orders (information). (b) (*Any one process, described with verbs.*) Meadowlark would **melt the wax, add fragrance and dye, and pour the mixture into moulds**, then leave the candles to set before removing and trimming them. (c) Meadowlark's **output** is the **finished scented candles** supplied to gift shops — a tangible good. Its processes **add value** by changing the **form** of its inputs: on their own, a block of wax, a length of wick and a bottle of fragrance oil are of little use to a gift shop, but melting, scenting, pouring, setting and trimming combine them into a finished candle that customers will buy. The value added is the difference between what the separate inputs are worth and what the completed candle sells for, and it is created entirely by the processes Meadowlark carries out on those inputs.

Q14. Processes are the **transformation activities that convert inputs into outputs** — the “doing” part of an operations system, best described with verbs. For a clothing manufacturer, the processes include **cutting the fabric, stitching the panels together and pressing the garment**. **Outputs** are the **finished goods or services that result from those activities** and are **delivered to customers** — for the same business, the **finished shirts** it supplies to retailers. The two elements therefore differ in **what they are** and in **when they exist**: a process is an **activity carried out on the inputs during** the transformation, whereas an output is the **result** that exists only *after* it. Calling “stitching” an output, or the shirts a process, confuses the work being done with the thing that work produces.

Q15. The three key elements of an operations system are linked in a **causal chain**. **Inputs** — the resources such as raw materials, labour, capital and information — are the starting point; on their own they produce nothing. The **processes** act on those inputs, **transforming** them by changing their form, condition or location, so the quality and quantity of the inputs directly affects what the processes can achieve. The processes in turn produce the **outputs**, the finished goods or services delivered to customers, so the **effectiveness of the processing determines the quality of the output**. The elements are therefore **interdependent** rather than three separate stages: a weakness anywhere in the chain flows through to a poorer output, and no element fully compensates for another — the best cabinet-maker cannot build a sound table from warped timber, and the finest timber is wasted by careless assembly. This is why an operations manager must manage all three elements together, and why the output is the clearest single measure of how well the whole system is working.

Q16. The espresso machines are a form of **capital/equipment**, which is an **input**, not a process. Inputs are the **resources** a business *uses* in production, and equipment such as espresso machines, grinders and cups are resources the café draws on. The café's **processes** are the **transformation activities** carried out *with* that equipment — **grinding the beans, extracting the espresso and steaming the milk**. The machine is therefore a tool that *enables* the process; it is not the activity itself. Classifying the machines as a “process” mistakes a resource for the work done with it, so the trainee is incorrect.

Q17. Information is an input because the **data and knowledge a business holds guide what it produces and how**. For example, **customer orders** tell the business what to make and in what quantity, **product designs and specifications** direct how each item should be produced, and **demand forecasts** help it plan how much to produce and when. By using this information as an input to its processes, the business can produce the right output, in the right amount, to the right standard — so information shapes the transformation just as physical resources do, even though it is not a physical material.

Q18. (*Model response — service operations system, applied to the case study.*) For **Tidewater Ferries**, an **input** is the **fuel** that powers its vessels (other inputs include the crew as labour and the ferries themselves as capital, and the

passengers' bookings as information). A **process** is **transporting passengers across the bay** — boarding them, sailing the route and disembarking them — which changes the passengers' **location**. The **output** is the **completed ferry trip**, an intangible service delivered to the passengers. These three elements **work together as a transformation process**: on their own, the fuel, the crew and the vessels do nothing for a passenger, but the processes apply those resources to move the passengers across the bay, and it is that change of location the passengers pay for. The elements are also **interdependent** — the **inputs limit what the processes can achieve** (too few crew and the ferry cannot sail on schedule), and the **effectiveness of the processes determines the output** (a well-run boarding and sailing routine produces an on-time, comfortable trip, while a poorly run one produces a late or crowded one).

Q19. Model response (10 marks). An **operations system** transforms inputs into outputs through a series of processes, and can be mapped for any business. Consider **Blackwood Joinery**, an original fictional business that manufactures timber dining tables. Its **inputs** are the resources it gathers for production: **raw materials** such as timber, screws and varnish; **labour** in the form of its cabinet-makers and finishers; **capital/equipment** such as saws, sanders, clamps and the workshop itself; and **information** such as customer orders and the design specifications for each table. Its **processes** are the transformation activities that convert these inputs into a finished product — **cutting** the timber to size, **assembling** the pieces, **sanding** the surfaces and **varnishing** the finished table. These processes **add value** by changing the **form** of the raw timber into a usable table that customers will pay for. The **output** is the **finished dining table**, a tangible good delivered to the customer.

The three elements are **interdependent** and together form a transformation process: the quality of Blackwood's inputs (well-seasoned timber, skilled cabinet-makers) affects what its processes can achieve, and the effectiveness of its processes (accurate cutting, careful finishing) determines the quality of the output. A warped board or a rushed glue-up shows up in the finished table, and strength at one stage does not make up for weakness at another. The processes are also where Blackwood **adds value** for its customers: a stack of timber, a box of screws and a tin of varnish are worth relatively little separately, but once cut, assembled, sanded and varnished they become a dining table a customer will pay far more for. That difference — between what the inputs cost and what the output is worth to the customer — is created by the processes, which is why the three elements must be managed as one system rather than as three separate stages. *(Full marks require: a clearly identified original business; accurate examples for all three elements — inputs across the categories, processes described as activities, and a correct output; an explanation of the transformation process linking the elements; and an explanation of how the processes add value for customers.)*

Q20. On **17 April 2023** Mars Wrigley Australia announced a further **\$28.8 million** for equipment upgrades at its Ballarat factory, after Mars, Snickers and Milky Way bars in paper-based wrappers reached Australian shelves from 10 April 2023. A change of this kind affects all three key elements. It begins with the **inputs**: the wrapping material is a **raw material** that is built into the finished bar, while the trial results and packaging specifications that guided the switch are **information**. The machinery the \$28.8 million funds is **capital/equipment**, and it is important to classify it correctly — new wrapping machinery is a **resource the business uses**, so it is an **input**, not a process. The **processes** are the transformation activities carried out with those resources: moulding and cooling the bars, then **wrapping** and packing them. Those processes **add value** by changing the **form** of the inputs, since blocks of chocolate and rolls of wrapping material are of little use to a retailer until they are combined into a sealed, labelled bar. The **outputs** are the finished wrapped bars, **tangible goods** delivered to retailers for sale. The elements are also **interdependent**, which is what the investment demonstrates: the business could not change one input in isolation, because equipment set up to wrap in plastic film cannot carry out the wrapping process on paper to the same standard, so the capital inputs had to change with the raw material. ∴ a change to a single input works through the whole system — it requires matching capital and processes if the output is still to meet customer expectations for quality.