Exercise walk-through

5.1
Operations and break-even: supported rehearsal

International Baccalaureate · IB Diploma · Business Management · SL

Operations management

- explain the role of operations and **value added**, and compare job, batch, **mass production** and **mass customisation**;
- analyse the factors that decide where a business locates, including outsourcing and reshoring;
- calculate contribution, break-even output, the margin of safety, target output and target price;

The role of operations and operations methods

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

Sources for this lesson

- International Baccalaureate, *Business Management guide* (first assessment 2024).
- Toyota Motor Corporation, reports on the 2011 Great East Japan Earthquake and its supply-chain recovery; Reuters reporting on Toyota's chip stocks (2021).
- T. Ohno, *Toyota Production System: Beyond Large-Scale Production* (1988).
- International Organization for Standardization, ISO 9001:2015 *Quality management systems*.

Exercises 2.1·2.2

2.1 The firm completes 2 000 repairs a month with 80 employees. Calculate labour productivity and state one way to raise it. [2]

repairs: 2000 a month

employees: 80

2.2 Price per repair is 25, variable cost 15 and monthly fixed costs 12 500. Calculate the contribution per repair and the monthly break-even quantity. [3]

price: 25

variable cost: 15

fixed costs: 12 500 a month

Exercises 2.1·2.2

2.1 The firm completes 2 000 repairs a month with 80 employees. Calculate labour productivity and state one way to raise it. [2]

repairs: 2000 a month

employees: 80

2.1 Labour productivity $= 2\,000/80 = 25$ repairs per employee per month (1). Any one: training to raise skill; better tools or layout; automation of booking; or producing the same output with fewer staff (1).

2.2 Price per repair is 25, variable cost 15 and monthly fixed costs 12 500. Calculate the contribution per repair and the monthly break-even quantity. [3]

price: 25

variable cost: 15

fixed costs: 12 500 a month

2.2 Contribution $= 25 - 15 = 10$ per repair (1). Break-even $= 12\,500/10 = 1\,250$ repairs a month (2).

Exercises 2.3·2.4

2.3 The firm currently completes 2 000 repairs a month. Calculate the margin of safety, in repairs and as a percentage of sales. [2]

actual output: 2000 repairs

2.4 The owner targets a monthly profit of 15 000. Calculate the required output. [3]

target profit: 15 000

Exercises 2.3·2.4

2.3 The firm currently completes 2 000 repairs a month. Calculate the margin of safety, in repairs and as a percentage of sales. [2]

actual output: 2000 repairs

2.3 Margin of safety $= 2\,000 - 1\,250 = 750$ repairs (1), which is $750/2\,000 \times 100 = 37.5\%$ of sales (1).

2.4 The owner targets a monthly profit of 15 000. Calculate the required output. [3]

target profit: 15 000

2.4 Target output $= (12\,500 + 15\,000)/10 = 27\,500/10 = 2\,750$ repairs a month (3 – 2 if the formula is right with a slip).

Exercise 2.5

2.5 The firm will open a fourth workshop. State one quantitative and one qualitative location factor, and say which should dominate for a repair service. [2]

quantitative qualitative

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2.5 Quantitative: site cost, labour cost, grants, transport costs (1). Qualitative: image, labour skills, infrastructure, proximity to customers, regulation (1). For a REPAIR SERVICE, customer proximity should dominate – customers drop off and collect, so access beats the cheaper rent.

Exercise 3.1

3.1 *(Original, Paper 1 style.)* The firm will add a subscription fleet: standard bikes serviced identically, but each subscriber chooses their own accessories and service intervals. Compare job, batch and flow production and recommend, with two reasons, the best method or combination. [6]



Exercise 3.1

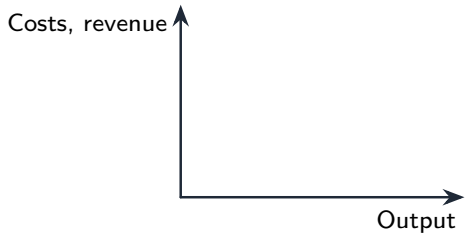
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3.1 Job: one-off custom work – perfect fit to choice, but the highest unit cost and slowest, wrong for a standard fleet (2). Batch: groups of identical services then switch – some flexibility with moderate cost, but changeover time and idle capacity between batches (2). Flow: continuous standardised servicing – lowest unit cost and speed, but inflexible; MASS CUSTOMISATION combines flow efficiency with choice at the accessories stage, which is exactly the subscription model (2). A recommendation committing to mass customisation (or flow with a job-type custom desk) earns the reasoning marks.

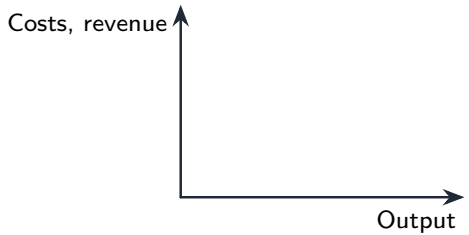
Exercise 3.2

3.2 *(Original, Paper 2 style.)* Using price 25, variable cost 15 and fixed costs 12 500 a month: draw and label the break-even chart, mark the break-even point and the margin of safety, and state one limitation of the model. [4]



Exercise 3.2

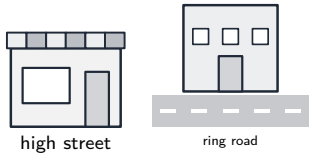
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3.2 Axes: output (repairs) and costs/revenue in money; TR a straight line from the origin at 25 per repair; TC the fixed line 12 500 rising by 15 per repair; the crossing at 1 250 repairs and about 31 250 of revenue is the break-even point; the margin of safety is the gap between 1 250 and the current 2 000 on the output axis (3). Limitation: price and variable cost are assumed constant and everything produced is sold, and step-fixed costs are ignored – so the chart is a model, fragile far from current output (1).

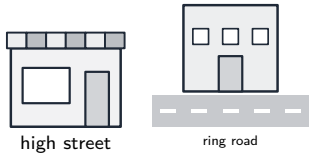
Exercise 3.3

3.3 *(Original, Paper 1 style.)* Two sites are available: a high-street unit at 4 500 a month by the station, or a ring-road unit at 2 800 a month with poorer customer access. Evaluate which site the firm should choose. [3]



Exercise 3.3

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3.3 The high street costs 1 700 a month more (4 500 − 2 800) – that is 170 extra repairs a month at the 10 contribution to pay for it (1). Being by the station, it should win drop-off trade: repairs are a convenience purchase, and access also builds the casual enquiry flow the ring road loses (1). Judgement: choose the high street IF the location adds at least 170 repairs a month – plausible by a station; if not, the ring road's 20 400 a year saved funds the marketing instead – the decision turns on a demand estimate, so pilot the access assumption first (1).

Local review guidance: formula, substitution, answer – the examiner marks the method even with arithmetic slips; each method's cost AND flexibility judged before the recommendation; (R1 3.3) the evaluation converts the rent difference into repairs and names the condition that decides it. This is authored classroom guidance.