5.1 Operations management

Name: _____ Class: _____ Date: _____ **Total: 25 marks**

KEY WORDS break-even analysis • margin of safety

Operations management

Objective

Measure productivity, choose operations methods, weigh location factors, and master the break-even arithmetic (syllabus 5.1–5.5).

1 Key knowledge and worked examples

Unit 5 toolkit. Transformation: inputs → process → outputs; efficiency vs effectiveness. Labour productivity = 2 000/80 = 25 repairs per employee per month. Methods: job, batch, flow, mass customisation. Location: quantitative factors (site cost, labour, grants, transport – rankable by weighted score) vs qualitative (image, skills, infrastructure, regulation); services follow customers. Price 25, variable cost 15, contribution 10, fixed costs 12 500 a month: BEQ = 1 250 repairs; margin of safety 750 = 37.5% of sales; a 15 000 profit needs 2 750.

2 Practice

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

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]

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]

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

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]

3 Exam-style questions

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]

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]

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]

Solutions

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

2.3 Margin of safety = 2 000 − 1 250 = 750 repairs (1), which is 750/2 000 × 100 = 37.5% of sales (1).

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).

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.

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.

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).

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.