

5.1 Operations management

Name: _____ Class: _____ Date: _____

Total: 26 marks

KEY WORDS break-even analysis • capacity utilisation

Operations management

Objective

Measure productivity, choose operations methods, master the break-even arithmetic, and (HL) apply lean quality, capacity and stock control, and contingency thinking (syllabus 5.1–5.9).

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. 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. HL: capacity $2\,000/2\,500 = 80\%$; buffer stock 200, lead time 2 weeks, reorder level $500 \times 2 = 1\,000$; JIT and kaizen; control vs assurance vs TQM; crisis vs contingency; patents, copyright, trademarks; data vs information.

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 workshops can service 2 500 repairs a month. Calculate capacity utilisation and state one problem of OVER-utilisation. [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, HL lean.*) The firm holds 1 400 parts, of which 200 are buffer stock; usage is 500 parts a week and lead time is two weeks. Explain just-in-time inventory management and evaluate ONE risk of adopting it here. [4]

3.3 (*Original, HL crisis.*) The single parts supplier is hit by a fire. Distinguish crisis management from contingency planning, and outline one contingency plan the firm should have had. [4]

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 $750/2\,000 \times 100 = 37.5\%$ 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 Capacity utilisation = $2\,000/2\,500 \times 100 = 80\%$ (1). Any one over-utilisation problem: no slack for maintenance or breakdowns; overtime and rush costs; quality falls under pressure; staff burnout (1).

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 JIT orders parts to arrive exactly when needed, so stock holding and its costs (storage, obsolescence, capital tied up – here roughly 1 400 parts could fall toward the 1 000 reorder level and below) approach zero, and quality faults surface immediately (2). Risk: with no buffer, ONE late or failed delivery stops servicing – the firm’s single supplier and two-week lead time make the exposure severe; a stockout costs contributions of 10 per repair and, worse, subscribers’ goodwill (2). Mitigation before adopting: dual sourcing or a small buffer – pure JIT does not fit a single-supplier, long-lead-time position.

3.3 Crisis management reacts DURING the event – respond, contain, recover, learn; contingency planning is written BEFORE, identifying risks and rehearsing responses (2). Plan: pre-qualify a SECOND parts supplier with agreed prices and a switched-on order route; hold the 200-part buffer explicitly for supplier failure; assign who decides and communicates in the first hour (2).

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 3.2) the risk evaluated against THIS firm’s single-supplier facts, not generic. This is authored classroom guidance.