Chapter 8 Cost Concepts Relevant to Decision Making

Classifying Cost

8.1

- Storage and material handling costs for raw materials: product cost (indirect costs)
- Gains or loss on disposal of factory equipment: period income (costs)
- Lubricants for machinery and equipment used in production: product cost (mfg. Overhead)
- Depreciation of a factory building: product cost (mfg. Overhead)
- Depreciation of manufacturing equipment: product cost (mfg. Overhead)
- Depreciation of the company president's automobile: period cost
- Leasehold costs for land on which factory buildings stand: period cost
- Inspection costs of finished goods: product cost
- Direct labor cost: product cost
- Raw materials cost: product cost
- Advertising expenses: period cost

Cost behavior

8.2

- Wages paid to temporary workers: Variable cost
- Property taxes on factory building: Fixed cost
- Property taxes on administrative building: Fixed cost
- Sales commission: Variable cost
- Electricity for machinery and equipment in the plant: Variable cost
- Heat and air-conditioning for the plant: Fixed cost
- Salaries paid to design engineers: Fixed cost
- Regular maintenance on machinery and equipment: Fixed cost
- Basic raw materials used in production: Variable cost

- Factory fire insurance: Fixed cost

8.3

(a) 6

(b) 11

(c) 5, (Note: It is tempting to select "1", but the graphs are drawn in cumulative basis)

(d) 4

(e) 2

(f) 10

(g) 3

(h) 7

(i) 9

8.4

Question	Output level	
	1,000 units	2,000 Units
(a) Total manufacturing cost	$98,000	$120,000
(b) Manufacturing cost per unit	$98	$60
(c) Total variable costs	$67,000	$104,000
(d) Total variable costs per unit	$67	$52
(e) Total costs to be recovered	$125,000	$162,000

Cost-Volume-Profit Relationships

8.5

(a) Total unit manufacturing costs if 30,000 units are produced: $21

$$\text{Total mfg. costs} = \$150,000 + \$300,000 + \$180,000 = \$630,000$$
$$\text{Unit cost} = \$630,000 / 30,000 = \$21$$

(b) Total unit manufacturing costs if 40,000 units are produced: $20.33

$$\text{Total mfg. costs} = \$200,000 + \$400,000 + \$133,333 + \$80,000 = \$813,333$$
$$\text{Unit cost} = \$813,333 / 40,000 = \$20.33$$

(c) Break-even price with 30,000 units produced: \$29.33

$$\text{Total cost} = \text{Mfg. cost + Selling \& Admin}$$
$$= \$630,000 + \$250,000 = \$880,000$$
$$\text{Unit cost} = \$880,000 / 30,000 = \$29.33$$

8.6

(a) Break-even sales volume: \$200,000

(b) Marginal contribution rate (MCR) = \$20,000/\$100,000 = 20%, which is equivalent to the slope of the profit-loss function.

(c) Let R = break-even sales dollars; F = total fixed cost; V = variable cost per unit; Q = sales price per unit

$$R = \frac{F}{1 - V/Q} = \frac{F}{MCR}; \quad 1 - \frac{V}{Q} = 0.2; \quad \frac{V}{Q} = 0.8;$$
$$1 - \frac{V}{0.95Q} = 1 - \frac{V}{Q}\frac{1}{0.95} = 1 - \frac{0.8}{0.95} = 0.1579;$$
$$R = \frac{\$40,000}{0.1579} = \$253,333$$

(d)

$$F = 1.1F = \$44,000$$
$$R = \frac{\$44,000}{0.2} = \$220,000$$

(e)

$$1 - \frac{V}{Q} = 0.2; \quad \frac{V}{Q} = 0.8;$$
$$1 - \frac{1.06V}{Q} = 1 - 1.06(0.8) = 0.1520;$$
$$R = \frac{\$40,000}{0.1520} = \$263,158$$

(f)

$$\frac{\$40,000 - \$20,000}{0.2} = \$100,000$$

8.7

(a) Total fixed cost to be recovered

(b) Sales volume & Profit/Loss

(c) Profit = 0

(d) Total revenue

(e) Break-even volume

8.8

(a)

No.	Description	No.	Description
1.	Profit (Loss)	6.	Break even
2.	Sales volume	7.	Loss
3.	Total manufacturing cost	8.	Profit
4.	Variable costs	9.	Total revenue
5.	Fixed costs	10.	Marginal contribution

(b)

Case	Unit Sold	Sales	Variable Expenses	Contribution Margin per Unit	Fixed Expenses	Net Income (Loss)
A	9,000	$270,000	$162,000	**$12**	$90,000	**$18,000**
B	**3,800**	$350,000	**$293,000**	$15	$170,000	$40,000
C	20,000	**$400,000**	$280,000	$6	**$85,000**	$35,000
D	5,000	$100,000	**$30,000**	**$14**	$82,000	($12,000)

Cost Concepts Relevant to Decision Making

8.9 Additional units ordered = 100
Labor cost = ($12)(5)(100) = $6,000
Material cost = ($4)(100) = $1,400
Overhead cost = (50%) ($6,000) = $3,000
Total cost = $6,000 + $1,400 + $3,000 = $10,400
Profit margin = (30%) ($10,400) = $3,120

$\therefore$ Unit price to quote = \$10,400 + \$3,120 = \$13,520

8.10

(a) Product mix that must satisfy: A:B = 4:3, or 4B = 3A (or B = 0.75A)

Break-even formula: Total revenue = Total cost: 10A + 12(0.75)A = 5A + 10(0.75)A + 2,600; 6.5A = 2,600; A = 400 units and B = 300 units

(b) 10A + 12A = 5A + 10A + 2,600; A = 371.43 units

(c) Compute the marginal contribution rate (MCR) for each product: Product A = \$5, Product B= \$2; with the assumption (A > 0 and B > 0), more preference should be given to product A

(d) Product A: MCR = \$5 per unit; Production time = 0.5 hour per unit; profit per hour = \$10

Product B: MCR = \$2 per unit; Production time = 0.25 hour per unit; profit per hour = \$8

Conclusion: Product A is more profitable, so it should be pushed first.

8.11

(a) Incremental cost

Description	In-house Option	Outscoring Option
Soldering operation		\$4.80
Direct materials	\$7.50	\$6.00
Direct labor	\$5.00	\$4.25
Mfg. Overhead	\$4.00	\$3.40
Fixed cost	\$0.20	\$0.20
Unit cost	\$16.70	\$18.65

The outsourcing option would cost \$1.95 more for each unit. Note that the fixed cost of \$20,000 (or \$0.20 per unit based on 100,000 production volume) remains unchanged under either option.

(b) Break-even price = \$4.80 - \$1.95 = \$2.85 per unit

Short Case Studies

ST 8.1

(a) Break-even volume:

- 6-day operation: capacity → 6,000 cwt/day, 6 days, Q = \$12.40 / cwt
  F = (\$4,200)(6 days) = \$25,200, V = [\$0.34+(\$4.34)(2.35)] = \$10.539 / cwt

$$F + NV = NQ$$

$$N_b = \frac{F}{Q-V} = \frac{\$25,200}{\$12.40-\$10.539} = 13,541$$

- 7-day operation: capacity → 6,000 cwt/day, 7 days, Q = \$12.40 / cwt
  F = (\$4,200)(6 days) + \$4,620 = \$29,820,
  V = [\$0.34(6/7) + \$0.66(1/7) + (\$4.34)(2.35)] = \$10.585 / cwt

$$F + NV = NQ$$

$$N_b = \frac{F}{Q-V} = \frac{\$29,820}{\$12.40-\$10.585} = 16,427$$

(b)

- 6-day operation:

$$MCR = 1 - \frac{V}{Q} = 1 - \frac{10.539}{12.40} = 0.1501$$

- 7-day operation:

$$MCR = 1 - \frac{V}{Q} = 1 - \frac{10.585}{12.40} = 0.1464$$

(c)

- Average total cost per cwt = $\frac{\$25,200}{(6,000)(6)} + \$10.539 = \$11.239 / \text{cwt}$

- Net profit margin before taxes = Sales – Costs = \$12.40 - \$11.239 = \$1.161 / cwt

(d)

- Sunday profit margin = $\$12.40 - [\frac{\$4,620}{6,000} + \$10.199 + \$0.66] = \$0.77 / \text{cwt} > 0.$

Yes, it could be economical for the mill to operate on Sunday. The incremental profit margin for the 7-day operation is less than the 6-day operation. Although Sunday operation is not as profitable due to the increased labor and fixed cost, the overall MCR is still positive.