

Chapter 3

2. Med-First is a medical facility that offers outpatient medical services. The facility is considering offering an additional service, mammography screening tests, on-site. The facility estimates the annual fixed cost of the equipment and skills necessary for the service to be \$120,000. Variable costs for each patient processed are estimated at \$35 per patient. If the clinic plans to charge \$55 for each screening test, how many patients must it process a year in order to break even?

Answer:

$$\begin{aligned} \text{Breakeven Quantity} &= \text{Fixed Cost} / (\text{Selling Price} - \text{Variable Cost}) \\ &= 120,000 / (55 - 35) = 6,000 \text{ patients} \end{aligned}$$

4. Slick Pads is a company that manufactures laptop notebook computers. The company is considering adding its own line of computer printers as well. It has considered the implications from the marketing and financial perspectives and estimates fixed costs to be \$500,000. Variable costs are estimated at \$200 per unit produced and sold.

(a) If the company plans to offer the new printers at a price of \$350, how many printers does it have to sell to break even?

(b) Describe the types of operations considerations that the company needs to consider before making the final decision.

Answer:

$$\begin{aligned} \text{a) Breakeven Quantity} &= \text{Fixed Cost} / (\text{Selling Price} - \text{Variable Cost}) \\ &= 500,000 / (350 - 200) = 3333.3, \text{ so } 3334 \text{ printers exceeds the} \\ &\text{breakeven} \end{aligned}$$

b) The operations considerations required for this decision are many. Among them are product design, process selection, supply chain management, facility location, employees, inventory management, and scheduling.

6. Harrison Hotels is considering adding a spa to its current facility in order to improve its list of amenities. Operating the spa would require a fixed cost of \$25,000 a year. Variable cost is estimated at \$35 per customer. The hotel wants to break even if 12,000 customers use the spa facility. What should be the price of the spa services?

Answer:

$$\begin{aligned} \text{Breakeven Quantity} &= \text{Fixed Cost} / (\text{Selling Price} - \text{Variable Cost}) \\ &\text{rearranges to:} \end{aligned}$$

$$\begin{aligned} \text{Selling price} &= (\text{Fixed Cost} / \text{Quantity}) + \text{Variable Cost} \\ &= 25,000 / 12,000 + 35 = \$37.083 \end{aligned}$$

Therefore, the spa needs to charge at least \$37.09 to avoid losing money on the spa.

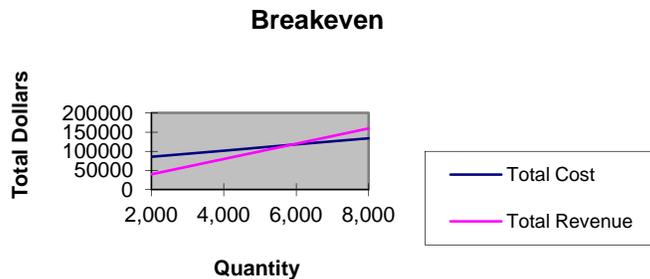
8. George Fine, owner of Fine Manufacturing, is considering the introduction of a new product line. George has considered factors such as costs of raw materials, new equipment, and requirements of a new production process. He estimates that the variable costs of each unit produced would be \$8 and fixed costs would be \$70,000.

(a) If the selling price is set at \$20 each, how many units have to be produced and sold for Fine Manufacturing to break even? Use both graphical and algebraic approaches.

- (b) If the selling price of the product is set at \$18 per unit, Fine Manufacturing expects to sell 15,000 units. What would be the total contribution to profit from this product at this price?
- (c) Fine Manufacturing estimates that if it offers the product at the original target price of \$20 per unit, the company will sell about 12,000 units. Which pricing strategy—\$18 per unit or \$20 per unit—will yield a higher contribution to profit?
- (d) Identify additional factors that George Fine should consider in deciding whether to produce and sell the new product.

Answer:

a.



$$\begin{aligned} \text{Breakeven Quantity} &= \text{Fixed Cost} / (\text{Selling Price} - \text{Variable Cost}) \\ &= 70,000 / (20 - 8) = 5,833.3 \end{aligned}$$

Fine does better than breakeven at 5,834 units

$$\begin{aligned} \text{b. contribution to Profit} &= \text{Total Revenue} - \text{Total Cost} = SP(Q) - [FC + VC(Q)] \\ &= 18(15,000) - [70,000 + 8(15,000)] = \$80,000 \end{aligned}$$

$$\begin{aligned} \text{c. contribution to Profit} &= \text{Total Revenue} - \text{Total Cost} = SP(Q) - [FC + VC(Q)] \\ &= 20(12,000) - [70,000 + 8(12,000)] = \$74,000 \end{aligned}$$

Setting the price at \$18 is more profitable by \$6,000.

- d. Additional factors include the accuracy of the demand forecasts and types of marketing techniques that might effectively promote sales.

10. Easy-Tech Software Corporation is evaluating the production of a new software product to compete with the popular word processing software currently available. Annual fixed costs of producing the item are estimated at \$150,000, and the variable cost is \$10 per unit. The current selling price of the item is \$35 per unit, and the annual sales volume is estimated at 50,000 units.

(a) Easy-Tech is considering adding new equipment that would improve software quality. The negative aspect of this new equipment would be an increase in both fixed and variable costs. Annual fixed costs would increase by \$50,000 and variable costs by \$3. However, marketing expects the better-quality product to increase demand to 70,000 units. Should Easy-Tech purchase this new equipment and keep the price of their product the same? Explain your reasoning.

(b) Another option being considered by Easy-Tech is the increase in the selling price to \$40 per unit to offset the additional equipment costs. However, this increase would result in a decrease in

demand to 40,000 units. Should Easy-Tech increase its selling price if it purchases the new equipment? Explain your reasoning.

Answer:

$$a. \text{ contribution to Profit} = \text{Total Revenue} - \text{Total Cost} = SP(Q) - [FC + VC(Q)]$$

$$\text{Current system:} \quad = 35(50,000) - [150,000 + 10(50,000)] = \$1,100,000$$

New Equipment:

new sales of 70,000 units; new fixed cost of \$200,000; new variable cost of \$13

$$\text{contribution to Profit} = \text{Total Revenue} - \text{Total Cost} = SP(Q) - [FC + VC(Q)]$$

$$= 35(70,000) - [200,000 + (13(70,000))] = \$1,340,000$$

Easy-Tech will have \$240,000 more profit with the new equipment.

$$b. \text{ contribution to Profit} = \text{Total Revenue} - \text{Total Cost} = SP(Q) - [FC + VC(Q)]$$

$$= 40(40,000) - [200,000 + 13(40,000)] = \$880,000$$

Easy-Tech should not consider the price increase as profits will be less than with the existing price.

12. Mop and Broom Manufacturing is evaluating whether to produce a new type of mop. The company is considering the operations requirements for the mop as well as the market potential. Estimates of fixed costs per year are \$40,000, and the variable cost for each mop produced is \$20.

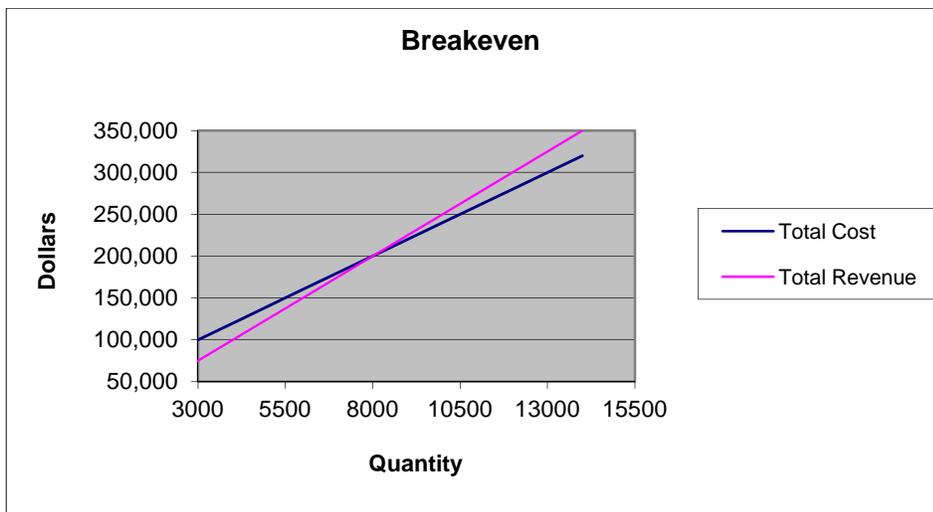
(a) If the company sells the product at a price of \$25, how many units of product have to be sold in order to break even? Use both the algebraic and graphical approaches.

(b) If the company sells 10,000 mops at the product price of \$25, what will be the contribution to profit?

Answer:

$$a. \text{ Breakeven Quantity} = \text{Fixed Cost} / (\text{Selling Price} - \text{Variable Cost})$$

$$\text{Breakeven quantity} = 40,000 / (25 - 20) = 8,000 \text{ mops.}$$

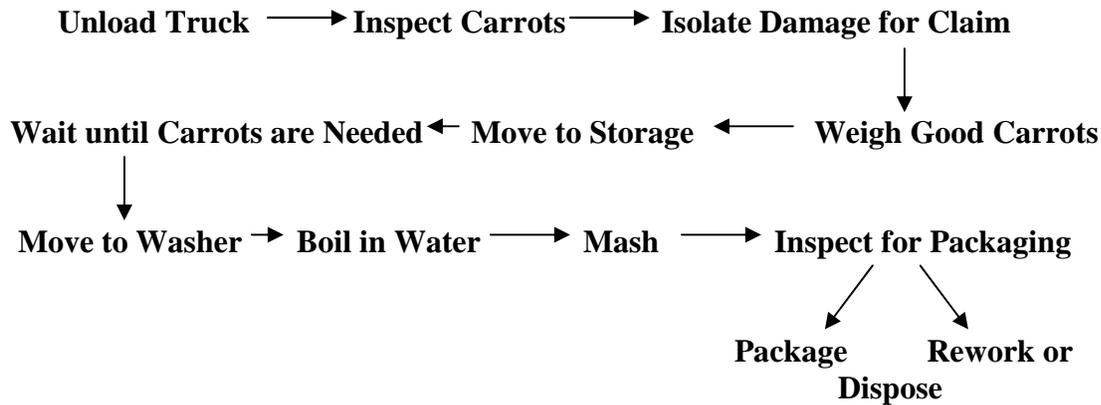


$$b. \text{ Contribution to Profit} = \text{Total revenue} - \text{Total Cost} = SP(Q) - [FC + VC(Q)]$$

$$= \$250,000 - \$240,000 = \$10,000$$

14. Jacob's Baby Food Company must go through the following steps to make mashed carrots: (1) unload carrots from truck; (2) inspect carrots; (3) weigh carrots; (4) move to storage; (5) wait until needed; (6) move to washer; (7) boil in water; (8) mash carrots; (9) inspect. Draw a process flow diagram for these steps.

Answer:



16. Oakwood Outpatient Clinic is analyzing its operation in an effort to improve performance. The clinic estimates that a patient spends on average 3.5 hours at the facility. The amount of time the patient is in contact with staff (i.e., physicians, nurses, office staff, lab technicians) is estimated at 40 minutes. On average the facility sees 42 patients per day. Their standard has been 40 patients per day. Determine process velocity and efficiency for the clinic.

Answer:

a. $Process\ Velocity = Throughput\ Time / Value-Added\ Time$
 $= 3.5 / .6667 = 5.25$

b. $Efficiency = Actual\ output / Standard\ Output$
 $= (42 / 40) \times 100\% = 105\%$

17. Oakwood Outpatient Clinic rents a magnetic resonance imaging (MRI) machine for 30 hours a month for use on its patients. Last month the machine was used 28 hours out of the month. What was machine utilization?

Answer:

Utility = used/available = $(28/30) \times 100\% = 93.3\%$