

Make or Buy Decision

Words of Wisdom ㄴ

“After you’ve done a thing the same way for two years, look it over carefully. After five years, regard it with suspicion. And after ten years, throw it away and start all over.” - Alfred Edward Perlman

Decision Analysis - Basic Steps

Operations/Supply Chain Managers make many decisions as they manage processes and supply chains.

1. Recognize and clearly define the problem.
2. Collect the information needed to analyze possible alternatives.
3. Choose and implement the most feasible alternative

Formal Procedures for Decision Analysis

1. *Break-Even Analysis:*

Break-even analysis helps the manager identify how much change in volume or demand is necessary before a second alternative becomes better than the first alternative.

2. *Decision Theory:*

Decision theory helps the manager choose the best alternative when outcomes are uncertain.

3. *Decision Tree:*

A decision tree helps the manager when decisions are made sequentially when today's best decision depends on tomorrow's decisions and events.

1. Break-Even Analysis - Total Cost

The **break-even quantity** is the volume at which total revenues equal total costs and such analysis is called “Breakeven Analysis”.

Total Cost = Fixed Cost + Variable Cost

Total cost = $F + c*Q$

Where,

F = Fixed Cost

c = Variable Cost Per Unit

Q = No. of Units (Quantity)

1. Break-Even Analysis - Total Revenue

Total Revenue = Price * Quantity

or

Total revenue = $p * Q$

Where,

p = Price (Selling)

Q = No. of Units (Quantity)

1. Break-Even Analysis - Break Even Condition

Total Cost = Total Revenue

$$F + c * Q = p * Q$$

Or

$$Q = F / P - c$$

Where,

Q = Break-Even Quantity

F = Fixed Cost

C = Variable Cost

P = *Price (Selling)*

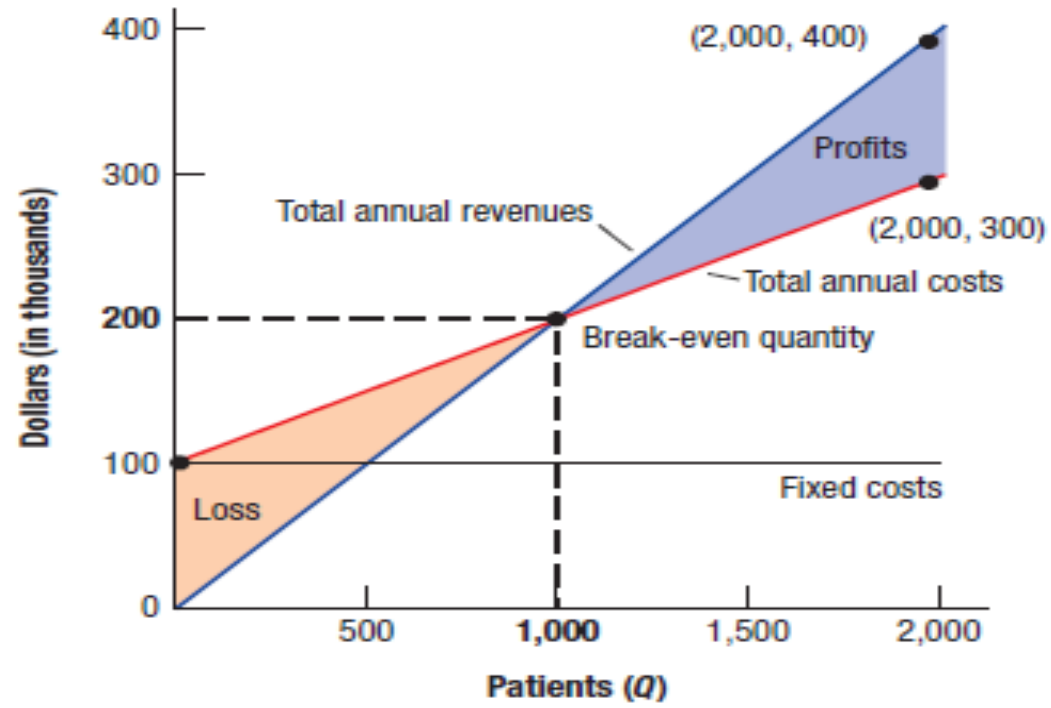
Break-Even - Example

Example : A hospital is considering a new procedure to be offered at \$200 per patient. The fixed cost per year would be \$100,000, with total variable costs of \$100 per patient. What is the break-even quantity for this service ?

Your Answer???

Q = 1000 Patients

Quantity (patients) (Q)	Total Annual Cost (\$) ($100,000 + 100Q$)	Total Annual Revenue (\$) ($200Q$)
0	100,000	0
2,000	300,000	400,000



Break-Even Analysis Application - Evaluation of Processes

- ▶ Often, choices must be made between two processes or between an internal process and buying services or materials on the outside.
- ▶ In such cases, we assume that the decision does not affect revenues.
- ▶ Rather than finding the quantity at which total costs equal total revenues, the analyst finds the quantity for which the total costs for two alternatives are equal.
- ▶ For the make-or-buy decision, it is the quantity for which the total “buy” cost equals the total “make” cost.

Evaluation of Processes - Make or Buy Decision

Let,

- ▶ *Fb* equal the fixed cost (per year) of the buy option.
- ▶ *Fm* equal the fixed cost (per year) of the make option.
- ▶ *cb* equal the variable cost (per unit) of the buy option.
- ▶ *cm* equal the variable cost (per unit) of the make option.

Thus,

$$Fb + cb * Q = Fm + cm * Q$$

Or

$$Q = Fm - Fb / cb - cm$$

Rule of the Game

- ▶ The make option should be considered, ignoring qualitative factors, only if its variable costs are lower than those of the buy option.
- ▶ The buy option is better if production volumes are less than the break-even quantity.
- ▶ Beyond that quantity, the make option becomes better.

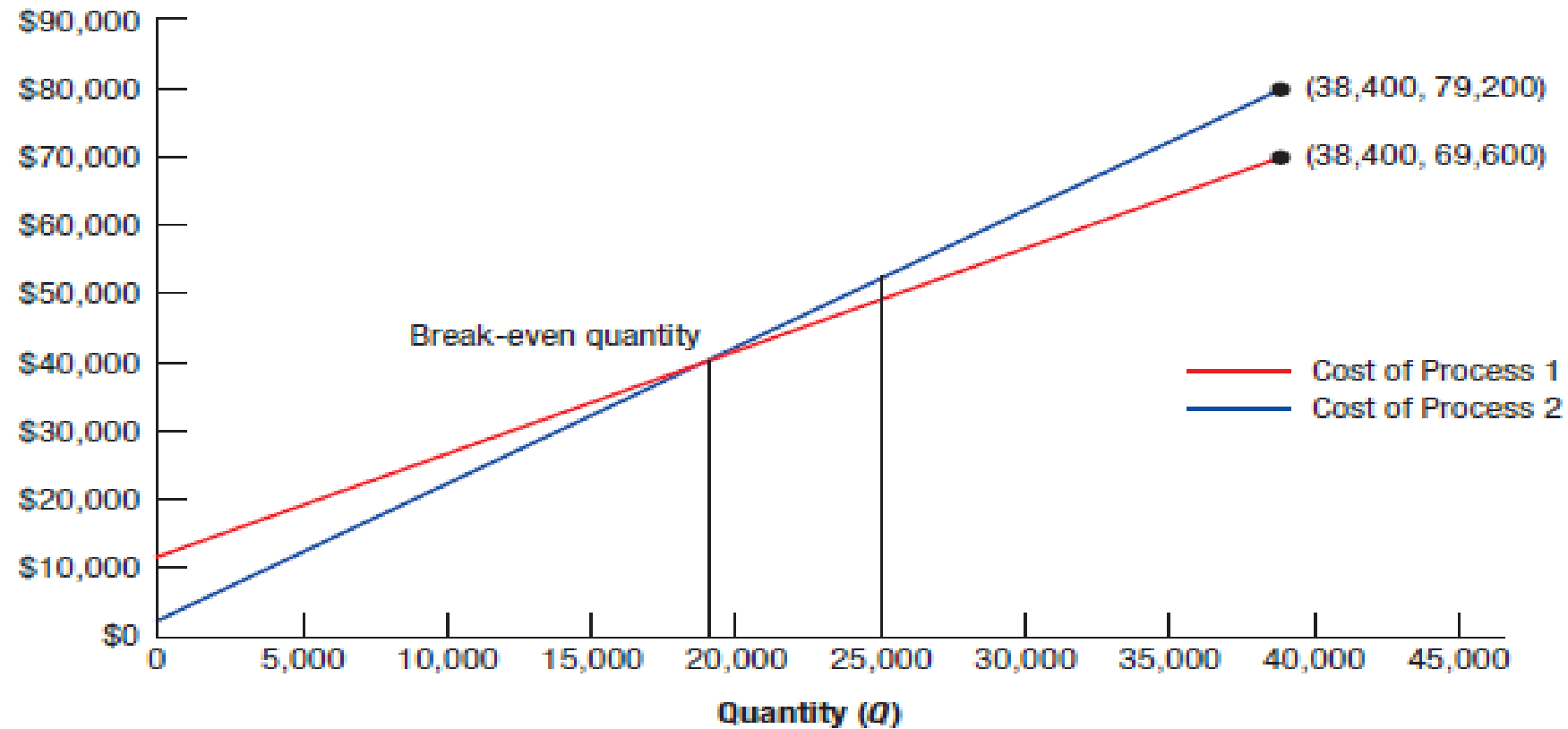
Example

- Example: The manager of a fast-food restaurant featuring hamburgers is adding salads to the menu. For each of the two new options, the price to the customer will be the same. The make option is to install a salad bar stocked with vegetables, fruits, and toppings and let the customer assemble the salad. The salad bar would have to be leased and a part-time employee hired. The manager estimates the fixed costs at \$12,000 and variable costs totaling \$1.50 per salad. The buy option is to have preassembled salads available for sale. They would be purchased from a local supplier at \$2.00 per salad. Offering preassembled salads would require installation and operation of additional refrigeration, with an annual fixed cost of \$2,400. The manager expects to sell 25,000 salads per year. What is the make-or-buy quantity?

Your Answer???

- ▶ $Q = 19,200$ salads

Example



Evaluation of Processes - Make or Buy Decision

Decision: The break-even quantity is 19,200 salads. As the 25,000-salad sales forecast exceeds this amount, the make option is preferred. Only if the restaurant expected to sell fewer than 19,200 salads would the buy option be better.

Exercise

Question: The owner of a small manufacturing business has patented a new device for washing dishes and cleaning dirty kitchen sinks. Before trying to commercialize the device and add it to his or her existing product line, the owner wants reasonable assurance of success. Variable costs are estimated at \$7 per unit produced and sold. Fixed costs are about \$56,000 per year.

- a. If the selling price is set at \$25, how many units must be produced and sold to break even?
- b. Forecasted sales for the first year are 10,000 units if the price is reduced to \$15. With this pricing strategy, what would be the product's total contribution to profits in the first year?

Exercise

Question: Spartan Castings must implement a manufacturing process that reduces the amount of particulates emitted into the atmosphere. Two processes have been identified that provide the same level of particulate reduction. The first process is expected to incur \$350,000 of fixed cost and add \$50 of variable cost to each casting Spartan produces. The second process has fixed costs of \$150,000 and adds \$90 of variable cost per casting.

- a. What is the break-even quantity beyond which the first process is more attractive?
- b. What is the difference in total cost if the quantity produced is 10,000?