**CHAPTER 1 SUPPLEMENT**

**OPERATIONAL DECISION-MAKING TOOLS: DECISION ANALYSIS**

**CHAPTER LEARNING OBJECTIVES**

S1. ***Appropriately use a variety of quantitative decision analysis techniques.*** In this supplement we have provided a general overview of decision analysis. To a limited extent, we have also shown that the logic of such operational decisions throughout the organization are interrelated to achieve strategic goals.

**TRUE-FALSE STATEMENTS**

1. In a decision making situation, the events that may occur in the future are known as states of nature.

Answer: True

Difficulty: Easy

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

2. When probabilities are assigned to states of nature, the situation is referred to as decision making under uncertainty.

Answer: False

Difficulty: Easy

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

3. The outcome of a decision in referred to as a payoff.

Answer: True

Difficulty: Easy

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

4. The most widely used decision-making criterion for situations with risk is expected value.

Answer: True

Difficulty: Easy

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

5. A decision criterion in which the decision payoffs are weighted by a coefficient of optimism is known as the Hurwicz criterion.

Answer: True

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

6. The LaPlace criterion is a decision criterion in which each state of nature is weighted equally.

Answer: True

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

7. A sequential decision tree is a graphical method for analyzing decision situations that require a sequence of decisions over time.

Answer: True

Difficulty: Easy

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

8. A decision criterion that results in the maximum of the minimum payoffs is called a maximin criterion.

Answer: True

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

9. Quantitative methods are tools available to operations managers to help make a decision or recommendation.

Answer: True

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

10. Quantitative methods are tools available to operations managers to help make a decision but *not* a recommendation.

Answer: False

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

11. Decision analysis is a quantitative technique supporting decision making with uncertainty.

Answer: True

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

12. A payoff table is a quantitative technique supporting decision making under uncertainty.

Answer: True

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

**MULTIPLE CHOICE QUESTIONS**

13. When probabilities can be assigned to the occurrence of states of nature in the future, the situation is referred to as

a) decision making under risk.

b) decision making under certainty.

c) decision making under uncertainty.

d) none of the above.

Answer: a

Difficulty: Easy

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

14. Which of the following techniques is the most widely used decision-making criterion under risk?

a) maximax criterion

b) minimax regret criterion

c) expected value criterion

d) Hurwicz criterion

Answer: c

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

15. The maximum value of perfect information to the decision maker is known as

a) the expected value of perfect information.

b) the expected value of imperfect information.

c) the minimum of the minimax regret.

d) none of the above.

Answer: a

Difficulty: Easy

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Knowledge

AACSB: Reflective Thinking

16. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand | Stable Demand | Decreasing Demand |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The best decision for the business using the maximax criterion would be to

a) make the large investment.

b) make the medium investment.

c) make the small investment.

d) choose increasing demand.

Answer: a

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Application

AACSB: Reflective Thinking

17. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand | Stable Demand | Decreasing Demand |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The best decision for the business using the maximin criterion would be to

a) make the large investment.

b) make the medium investment.

c) make the small investment.

d) choose stable demand.

Answer: c

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Application

AACSB: Reflective Thinking

18. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand | Stable Demand | Decreasing Demand |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The best decision for the business using the minimax regret decision criterion would be to

a) make the large investment.

b) make the medium investment.

c) make the small investment.

d) choose decreasing demand.

Answer: b

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

19. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand | Stable Demand | Decreasing Demand |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The best decision for the business using the Hurwicz criterion with a coefficient of optimism equal to 0.80 would be to

a) make the large investment.

b) make the medium investment.

c) make the small investment.

d) choose stable demand.

Answer: a

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Application

AACSB: Reflective Thinking

20. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand | Stable Demand | Decreasing Demand |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The best decision for the business using the equal likelihood criterion would be to

a) make the large investment.

b) make the medium investment.

c) make the small investment.

d) choose increasing demand.

Answer: a

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Application

AACSB: Reflective Thinking

21. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The business believes that the probability for increasing, stable and decreasing product demand are 0.4, 0.5, and 0.1, respectively. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand (0.4) | Stable Demand (0.5) | Decreasing Demand (0.1) |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The expected value for the large investment decision is

a) $700,000.

b) $540,000.

c) $330,000.

d) $165,000.

Answer: b

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

22. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The business believes that the probability for increasing, stable and decreasing product demand are 0.4, 0.5, and 0.1, respectively. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand (0.4) | Stable Demand (0.5) | Decreasing Demand (0.1) |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The expected value for the small investment decision is

a) $540,000.

b) $400,000.

c) $330,000.

d) $165,000.

Answer: d

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

23. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The business believes that the probability for increasing, stable and decreasing product demand are 0.4, 0.5, and 0.1, respectively. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand (0.4) | Stable Demand (0.5) | Decreasing Demand (0.1) |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The expected value for the medium investment decision is

a) $600,000.

b) $540,000.

c) $330,000.

d) $165,000.

Answer: c

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

24. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The business believes that the probability for increasing, stable and decreasing product demand are 0.4, 0.5, and 0.1, respectively. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand (0.4) | Stable Demand (0.5) | Decreasing Demand (0.1) |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

If the expected value criterion is used then the best decision would be to

a) make the large investment.

b) make the medium investment.

c) make the small investment.

d) choose the stable demand.

Answer: a

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

25. A family business is considering making an investment in its manufacturing operation. Three decisions are under consideration: (1) a large investment; (2) a medium investment; and (3) a small investment. The business believes that there are three possible future outcomes for its product: (1) increasing demand; (2) stable demand; and (3) decreasing demand. The business believes that the probability for increasing, stable and decreasing product demand are 0.4, 0.5, and 0.1, respectively. The following payoff table describes the decision situation:

|  |  |  |  |
| --- | --- | --- | --- |
| States of Nature | | | |
| Decision | Increasing Demand (0.4) | Stable Demand (0.5) | Decreasing Demand (0.1) |
| Large Investment | $1,000,000 | $400,000 | -$600,000 |
| Medium Investment | 500,000 | 300,000 | -200,000 |
| Small Investment | 250,000 | 125,000 | 25,000 |

The expected value of perfect information for the family business is

a) $602,500.

b) $540,000.

c) $62,500.

d) $25,000.

Answer: c

Difficulty: Hard

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

26. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand | Low Demand |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The best decision for the manufacturer using the maximax decision criterion is to

a) expand facilities.

b) acquire competitor.

c) subcontract production.

d) select high demand.

Answer: a

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Application

AACSB: Reflective Thinking

27. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand | Low Demand |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The best decision for the manufacturer using the maximin decision criterion is to

a) expand facilities.

b) acquire competitor.

c) subcontract production.

d) select high demand.

Answer: c

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Application

AACSB: Reflective Thinking

28. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand | Low Demand |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The best decision for the manufacturer using the minimax regret decision criterion is to

a) expand facilities.

b) acquire competitor.

c) subcontract production.

d) select high demand.

Answer: b

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

29. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand | Low Demand |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The regret that is associated with the decision to acquire competitor when demand is low is

a) $0.

b) $525,000.

c) $1,250,000.

d) $1,275,000.

Answer: b

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

30. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand | Low Demand |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The best decision for the manufacturer using the Hurwicz decision criterion with a coefficient of optimism equal to 0.3 is to

a) expand facilities.

b) acquire competitor.

c) subcontract production.

d) make no decision.

Answer: c

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Application

AACSB: Reflective Thinking

31. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand | Low Demand |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The value of the Hurwicz decision criterion for subcontract production when the coefficient of optimism is 0.30 is

a) $92,500.

b) $182,500.

c) $250,000.

d) $275,000.

Answer: a

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Application

AACSB: Reflective Thinking

32. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand | Low Demand |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The best decision for the manufacturer using the equal likelihood criterion is to

a) expand facilities.

b) acquire competitor.

c) subcontract production.

d) select high demand.

Answer: a

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

33. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand, with probabilities of 0.6 and 0.4, respectively. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand (0.6) | Low Demand (0.4) |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The expected value for the expand facilities decision is

a) $250,000.

b) $160,000.

c) $700,000.

d) $1,200,000.

Answer: c

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

34. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand, with probabilities of 0.6 and 0.4, respectively. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand (0.6) | Low Demand (0.4) |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The expected value for the acquire competitor decision is

a) $250,000.

b) $160,000.

c) $700,000.

d) $1,200,000.

Answer: a

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

35. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand, with probabilities of 0.6 and 0.4, respectively. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand (0.6) | Low Demand (0.4) |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The expected value for the subcontract production decision is

a) $250,000.

b) $160,000.

c) $700,000.

d) $1,200,000.

Answer: b

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

36. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand, with probabilities of 0.6 and 0.4, respectively. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand (0.6) | Low Demand (0.4) |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The best decision according to the expected value criterion is

a) acquire competitor.

b) expand facilities.

c) subcontract production.

d) high demand.

Answer: b

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

37. A small parts manufacturer has just engineered a new product for the automotive industry. In order to produce the part the company can expand existing facilities, acquire a competitor, or subcontract production. The company believes the product will either experience high market demand or low market demand, with probabilities of 0.6 and 0.4, respectively. The following payoff table describes the company’s decision situation:

|  |  |  |
| --- | --- | --- |
|  | States of Nature | |
| Decision | High Demand (0.6) | Low Demand (0.4) |
| Expand Facilities | $2,000,000 | -1,250,000 |
| Acquire Competitor | 750,000 | -500,000 |
| Subcontract Production | 250,000 | 25,000 |

The expected value of perfect information for the small parts manufacturer is

a) $1,210,000.

b) $700,000.

c) $510,000.

d) $312,500.

Answer c

Difficulty: Hard

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Analysis

AACSB: Reflective Thinking

38. If payoffs are costs rather than profits, then

a) using any quantitative decision making tools is not possible at all.

b) it is necessary to find more financial data of the company to determine the profits.

c) the tools have to be adjusted so that a profit maximization method becomes a cost minimization method, for example.

d) none of the above.

Answer: c

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

Blooms: Comprehension

AACSB: Reflective Thinking

**SHORT-ANSWER ESSAY QUESTIONS**

38. What is decision analysis?

Answer: Decision analysis is a set of quantitative techniques for decision-making situations in which uncertainty exists. Decision analysis is a generic technique that can be applied to a number of different types of operational decision-making areas. The study of decision analysis is useful because it provides a structured, systematic approach to decision making that many decision makers follow intuitively without ever consciously thinking about it. Thus, decision analysis represents not only a collection of decision-making techniques but also an analysis of the logic underlying decision making.

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

aacsb006; blooms002

N2. Why and how are decision trees being used?

Answer: A payoff table is limited to a single decision situation. If a decision requires a series of decisions, a payoff table cannot be created, and a sequential decision tree must be used. Decision trees are a graphical method for analyzing decision situations that require a sequence of decisions over time. Decision trees allow the decision maker to see the logic of decision making by providing a picture of the decision process. The square nodes represent decisions and the circle nodes reflect different states of nature and their probabilities. The decision analysis process starts at the end of the decision tree and works backward toward a decision at node 1. During this backward pass, at outcome nodes expected values are computed, at decision nodes a decision must be made.

Difficulty: Medium

Learning Objective: Appropriately use a variety of quantitative decision analysis techniques.

Section Reference: S1.1 Decision Analysis with and without Probabilities

aacsb006; blooms002

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