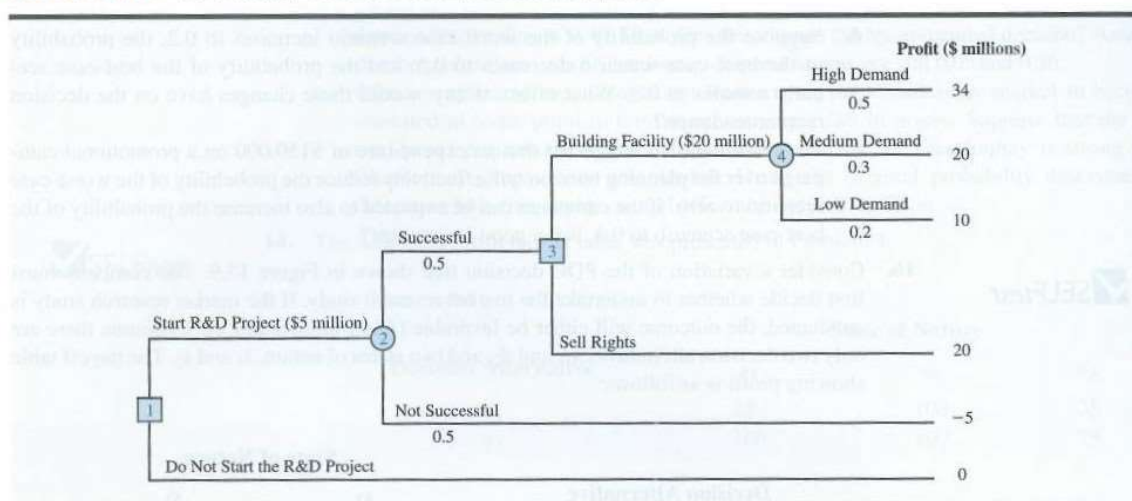


17. Hemmingway, Inc., is considering a \$5 million research and development (R&D) project. Profit projections appear promising, but Hemmingway's president is concerned because the probability that the R&D project will be successful is only 0.50. Furthermore, the president knows that even if the project is successful, it will require that the company build a new production facility at a cost of \$20 million in order to manufacture the product. If the facility is built, uncertainty remains about the demand and thus uncertainty about the profit that will be realized. Another option is that if the R&D project is successful, the company could sell the rights to the product for an estimated \$25 million. Under this option, the company would not build the \$20 million production facility. The decision tree is shown in Figure 13.18. The profit projection for each outcome is shown at the end of the branches. For example, the revenue projection for the high demand outcome is \$59 million. However, the cost of the R&D project (\$5 million) and the cost of the production facility (\$20 million) show the profit of this outcome to be  $\$59 - \$5 - \$20 = \$34$  million. Branch probabilities are also shown for the chance events.
- Analyze the decision tree to determine whether the company should undertake the R&D project. If it does, and if the R&D project is successful, what should the company do? What is the expected value of your strategy?
  - What must the selling price be for the company to consider selling the rights to the product?
  - Develop a risk profile for the optimal strategy.

FIGURE 13.18 DECISION TREE FOR HEMMINGWAY, INC.



22. Lawson's Department Store faces a buying decision for a seasonal product for which Demand can be high, medium, or low. The purchaser for Lawson's can order one, two, or three lots of the product before the season begins but cannot reorder later. Profit projections (in thousands of dollars) are shown.

Decision Alternative	State of Nature		
	High Demand	Medium Demand	Low Demand
Order 1 lot, $d_1$	60	60	50
Order 2 lots, $d_2$	80	80	30
Order 3 lots, $d_3$	100	70	10

- If the prior probabilities for the three states of nature are 0.3, 0.3, and 0.4, respectively, what is the recommended order quantity?
- At each preseason sales meeting, the vice president of sales provides a personal opinion regarding potential demand for this product. Because of the vice president's enthusiasm

optimistic nature, the predictions of market conditions have always been either “excellent” ( $E$ ) or “very good” ( $V$ ). Probabilities are as follows:

$$\begin{aligned} P(E) &= 0.70 & P(s_1 | E) &= 0.34 & P(s_1 | V) &= 0.20 \\ P(V) &= 0.30 & P(s_2 | E) &= 0.32 & P(s_2 | V) &= 0.26 \\ & & P(s_3 | E) &= 0.34 & P(s_3 | V) &= 0.54 \end{aligned}$$

What is the optimal decision strategy?

c. Use the efficiency of sample information and discuss whether the firm should consider a consulting expert who could provide independent forecasts of market conditions for the product.