SYNISTANAI TECHNOLOGY LABS – A PRESCRIPTIVE ANALYTICS CASE

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Overview

Synistanai Technology Labs, located in Northern California, specializes in the design and manufacture of 3D printers. Business has continued to sore with sales reaching $40 million during the last reporting period, which represented a fifteen percent increase over the prior year. At a recent board meeting Synistanai's CEO, Dr. Robert Murphy, presented a plan for acquiring a new production facility to handle the expected demand for the firm's latest 3D printer, the RB-5000, which is presently under beta testing. Murphy indicated that the estimated overall market for this class of product would either be $100 million or $200 million per year for the next five years. He stated that there was a fifty percent chance of the higher figure. Furthermore, he reported that his latest business intelligence suggested that a new competitor, PrintTech, might enter this new market with a somewhat similar product. Murphy estimated the chances at 50-50 of Print Tech entering the market, and if they did Synistanai's market share would drop from 40 percent to 30 percent. Murphy also reported that the latest manufacturing cost estimates were also somewhat uncertain because of the nature of the product and the requisite production technology. He reported that there was a 50 percent probability that the cost of goods sold (COGS) would be 70 percent of gross sales and a similar probability that the COGS would be 80 percent. The CEO indicated the company's standard decision criteria on major investments, like the proposed one, was twofold: 1) A profitability Index (PI) of at least 1.2 and 2) a 75 percent chance that the expected net present value (NPV) would be greater than zero. As the meeting was concluding Dr. Murphy turned to his Chief Analytics Officer, Dr. Fred Johnson and directed him to prepare an assessment of the proposal for next month's board meeting. Presented in Table 1 are the investment parameters associated with the proposed expansion. The purpose of this learning case is to illustrate how prescriptive analytics can be used in making capacity planning decision under risk involving the principle of net present value.

Table 1 – Investment Parameters

Item	Estimate
Initial Investment	$50 million
Life	5 years
Tax Return	40%
Discount Rate	10%
Salvage Value	$5 million
Construction Time	6 months

Discussion Questions

1. Develop a probability tree for analyzing this case.
2. Compute the net cash flows for years one through ten using the expected value concept.

3. Compute the NPV on the expected value of the net cash flows.
4. Compute the net cash flows for the worst-case scenario.
5. Compute the NPV on the cash flows for the worst-case scenario.
6. Compute the NPV for each of the eight possible sets of conditions from the problem.
7. Compute the mean and standard deviation of the eight project NPV values.
8. Evaluate the proposed project based on the reported CEO's decision criteria.
9. What is the impact on the investment decision if the chances of a $200 million market are increased to 60 percent?