Statistical problem

Topic: Statistical Problem A new product has the following profit projections and associated probabilities. Profit probability

$150, 000 0. 10

$100, 000 0. 25

$50, 000 0. 20

0 0. 15

-$50, 000 0. 20

-$100, 000 0. 10

a. Use the expected value approach to decide whether to market the new product.

Expected Value = ($150000 * 0. 10) + ($100000 * 0. 25) + ($50000 * 0. 20) + ($0 * 0. 15) + (-$50000 * 0. 20) + (-$100000 * 0. 10) = $30, 000.

b. Because of the high dollar values involved, especially the possibility of a $100, 000 loss, the marketing vice president has expressed some concern about the use of the expected value approach. As a consequence, if a utility analysis is performed, what is the appropriate lottery?

The appropriate lottery or gamble to assess the utility of the profit projections is to take a risk of marketing the product or avoid the risk by not marketing the product. Let the utility of the most favourable outcome (market the product) be U= 1 and the utility of the least favourable outcome (not market the product) be U = 0.

c. Assume that the following indifference probabilities are assigned, do the utilities reflect the behavior of a risk taker or a risk avoider?

Profit indifference probability (P)

$100, 000 0. 95

$50, 000 0. 70

0 0. 50

-$50, 000 0. 25

The indifference probability concept shows that with 95% chance of making a profit of $100, 000, the customer is indifferent between the decisions of marketing & not marketing the product.

Consider following decision tree:

The highest profit is cosidered to be the most favourable outcome and hence assigned the utility 1. The lowest profit is cosidered to be the least favourable outcome and hence assigned the utility 0. The utilities of the remaining profit projections are obtained as follows:

Utility of profit $100000 = (0. 95*1) + (0. 05*0) = 0. 95

Similarly,

Utility of profit $50000 = (0. 70*1) + (0. 30*0) = 0. 70

Utility of $0 = (0. 50*1) + (0. 50*0) = 0. 50

Utility of loss $50000 = (0. 25*1) + (0. 75*0) = 0. 25

We observe that higher the profit projections higher the utilities. Thus the utilities reflect the behaviour of a risk taker.

d. Use expected utility to make a recommended decision.

Expected utility = Pi * Ui = 0. 6025

where i refers the profit projections, P and U are their corresponding probabilities and utilities respectively.

Expected profit = ($150, 000 * 0. 6025) + (-$100, 000 * (1-0. 6025)) = $50625.

e. Should the decision maker feel comfortable with the final decision recommended by the analysis?

As the expected profit from the utility analysis is greater than that obtained

from expected value approach, the decision maker can feel confident about

marketing the product.