Kris Mas Solution Sheet

Evaluation
Two periods: June and December
Discount rate: 20%/year – his rate for money, for his best project, his opportunity cost
Projects profits per unit sold is 3$ = (15-12)
NPV = -20 + (12,000 x 3)/1.1 ~ -20 + 32.4 = 12.4 money in thousands

Recognizing Uncertainty
Histograms differ because production is capacity constrained to 12,000 units.
NPV for each outcome indicated in expression below

Value under Uncertainty
NPV = -20 + discounted expected value
= -20 + (1/1.0) [(0.1 x 36) + (0.6 x 30) + (0.3 x 15)]
= -20 + (0.9) [3.6 + 18 + 4.5] = -20 +(0.9)[26.1] ~ 3.5

Flexibility
The base decision tree shows 1 decision with 3 outcomes
The one with flexibility shows first decision augmented by cost of Tom in June (3)
And a second decision in December to keep Tom on if demand is 50,000, or not if demand is lower (either 5,000 or 10,000)
The Flexible decision has an extra cost of -3 at start, and a further cost of -3 IF there is the possibility (p = 0.1) of boosting production from 12,000 to 50,000.
The Present Value of the incremental cash flows are:
Change in NPV = - 3. + (p=0.1) (0.9) [-3 + (38 x3)] = -3 + (0.1)(0.9)[111) ~ -3 + 10 ~ 7
So NPV with Flexibility ~ 7 + 3.5 = 10.5 – go for it

EVPI
We Insert the Test as a decision before the Decision Tree for Flexible case
We do not give it a cost – we assume that we have it and see how much it is worth
Then we decide how much to pay for actual test (or consultancy) -- which isn't perfect
Perfect test has 2 outcomes in this case:
1) 10% chance that sales = 50,000 – if so go for it
NPV in that case = (0.1) [-23 (=20 +Tom) + (0.9)[(50 x 3) – 3(more Tom)]]
= (0.1) [-23 + (0.9) [147]] = 0.1 (109.3) ~ 10.9
2) or 90% of either other two possibilities, whose net present value we calculated first
So NPV in the "not 50,000" case is = (0.9) [-23 + (0.9)[(0.6 x 30) + (0.3 x 15)]]
= (0.9) [-23 + (0.9) [22.5]] – which is negative
So, if you knew in advance that you couldn't get the 50,000, you would NOT go forward with project, and avoid the downside.
EVPI = value after perfect test – value without = 10.9 – 10.5 = 0.4
No way additional info worth the 2,000$

I hope I didn't make an arithmetic mistake while typing.
Focus on the rationale of what needs to be done (as I done in grading tests!)

IDS.333 Risk and Decision Analysis

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