

***ADVANCED CAPITAL
BUDGETING DECISIONS***

CLASS 3-HW-Q6

Topic Simulation

Question 6:

Envestnet Ltd. is evaluating an investment proposal which has uncertainty associated with the three important aspects: the original cost, the useful life, and the annual net cash flows. The three probability distribution for these variables are shown below:

Original cost		Useful life		Annual net cash inflows	
Value	Probability	Period	Probability	Value	Probability
Rs.60,000	0.3	5 years	0.4	Rs.10,000	0.1
Rs.70,000	0.6	6 years	0.4	Rs.15,000	0.3
Rs.90,000	0.1	7 years	0.2	Rs.20,000	0.4
				Rs.25,000	0.2

The firm wants to perform five simulation runs of its project's life. The firm's cost of capital is 15% p.a. and the risk-free rate is 6% p.a.; for simplicity it is assumed that these two values are known for certain and will remain constant over the life of the project.

You are required to simulate the probability distributions of original cost, useful life and annual net cash inflows, using the following sets of random numbers:

09, 84, 41, 92, 65; 24, 38, 73, 07, 04; and 07, 48, 57, 64, 72 respectively each of the five simulations runs.

(Source: FOD)

ANSWER:

To simulate the probability distributions corresponding to original cost, useful life and annual net cash inflows, we assign an appropriate set of random numbers as shown below:

ORIGINAL COST			
Value (Rs.)	Probability	Cumulative probability	Random number
60,000	0.3	0.3	00 – 29
70,000	0.6	0.9	30 – 89
90,000	0.1	1.0	90 – 99
USEFUL LIFE			
Period	Probability	Cumulative probability	Random number
5 years	0.4	0.4	00 – 39
6 years	0.4	0.8	40 – 79
7 years	0.2	1.0	80 – 99
NET CASH INFLOWS			
Value (Rs.)	Probability	Cumulative probability	Random number
10,000	0.1	0.1	00 – 09
15,000	0.3	0.4	10 – 39

20,000	0.4	0.8	40 – 79
25,000	0.2	1.0	80 – 99

The five simulation runs are now performed and the results are tabulated below:

Simulation run	Original cost		Useful life		Annual net cash inflow	
	Random number	Value (Rs.)	Random number	Period (years)	Random number	Value (Rs.)
1	09	60,000	24	5	07	10,000
2	84	70,000	38	5	48	20,000
3	41	70,000	73	6	57	20,000
4	92	90,000	07	5	64	20,000
5	65	70,000	04	5	72	20,000

Now let us calculate NPV and payback period for run 1 to run 5. The risk-free rate is given to be 6%. Thus, the discounting rate is taken to be 6% assuming that the required rate of return is 6% for the risk-free investment projects of the company:

Period (t)	Run one			Run two	
	Cash flow	PVIF _(6%,n)	(2) × (3)	Cash flow	(3) × (5)
(1)	(2)	(3)	(4)	(5)	(6)
0	–60,000	1.000	–60,000	–70,000	–70,000
1	10,000	0.9434	9,434	20,000	18,868
2	10,000	0.8900	8,900	20,000	17,800
3	10,000	0.8396	8,396	20,000	16,792
4	10,000	0.7921	7,921	20,000	15,842
5	10,000	0.7473	7,473	20,000	14,946
6		0.7050	42,124		84,248
	NPV = (Rs.17,876)			NPV = Rs.14,248	
	Payback period will exceed 5 years			Payback period = 4.05 years	

Period (t)	Run three		Run four		Run five	
	Cash flow	(3) × (7)	Cash flow	(3) × (9)	Cash flow	(3) × (11)
(1)	(7)	(8)	(9)	(10)	(11)	(12)
0	–70,000	–70,000	–90,000	–90,000	–70,000	–70,000
1	20,000	18,868	20,000	18,868	20,000	18,868
2	20,000	17,800	20,000	17,800	20,000	17,800
3	20,000	16,792	20,000	16,792	20,000	16,792
4	20,000	15,842	20,000	15,842	20,000	15,842
5	20,000	14,946	20,000	14,946	20,000	14,946
6	20,000	14,100				
		98,348		84,248		84,248

	NPV = Rs.28,348	NPV = (Rs.5,752)	NPV = Rs.14,248
	Payback period = 4.05 years	Payback period will exceed 5 years	Payback period = 4.05 years.