Risk → risk is a condition where there is a possibility of deviation between desired and expected outcomes.

→ The term project risk means variability in project net PW.

Sources of project risk

→ nature of business involved
→ length of the study period used in the economy
→ Rate of interest
→ Type of physical plant and equipment used
→ cash flow estimate
→ Social risk and unclear specification

Method of Describing project risk

① Sensitivity Analysis

→ A sensitivity analysis reflects how much net PW will change in response to given change in and input parameter.

P.T.O

Steps for sensitivity graph analysis

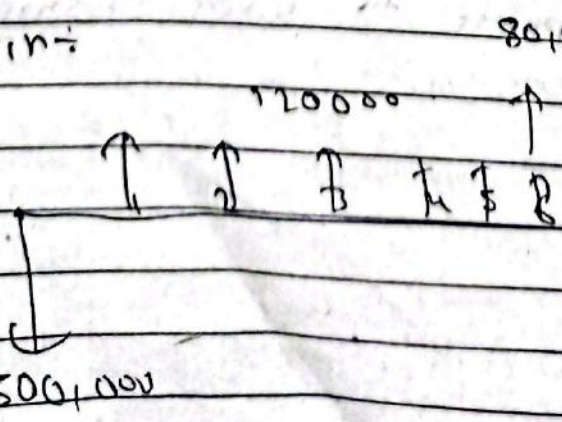
1. Plot PW, FW, AW, IRR or ERR on y-axis
2. % error in estimate of parameter value is plotted in x-axis.
3. Slope of the line shows level of sensitivity
4. The steeper the slope, more sensitivity.

* Perform sensitivity analysis for the following project over range of ±30% in parameter

(a) Initial Investment (b) Annual revenue
(c) Salvage value (d) life year

IC = 500000
AR = 120000
SV = 80000
L.Y = 6 year
MARR = 10% per year

Soln:



(AW, FW, IRR, ERR le hi same micha analysis)

(0%)

$PW = -500{,}000 + 120000 (P/A, 10\%, 6) + 80{,}000 (P/F, 10\%, 6)$

$= 67789.19834$

Writing in ~~a~~ format

$PW = -I + A.R \left[\frac{1.1^N - 1}{1.1^N \times 0.1} \right] + SV \times 1.1^{-N}$

Now,

For I varies from ~~±10~~ ~~+30~~ −30% to +30%

(only change here → calc; same)

$PW(-30\%) = -500{,}000(1-0.3) + 120000(P/A, 10\%, 6) + 80{,}000 (P/F, 10\%, 6)$ (same)

$= 217789.19$

$PW(-20\%) = 167789.19$
$PW(-10\%) = 117789.19$
$PW(0\%) = 67789.19834$
$PW(+10\%) = 17789.19834$
$PW(+20\%) = -32210.80166$
$PW(+30\%) = -82210.801$

For A·K

$$PW = -500{,}000 + 120{,}000\left[\frac{1.1^6-1}{1.1^6 \times 0.1}\right] \times x + 80{,}000 \times 1.1^{-6}$$

PW (−30%)	= −89 000
PW (−20%)	= −36737
PW (−10%)	= 15526.06
PW (0%)	= 67789.19
PW (10%)	= 120052.32
PW (20%)	= 172315.455)
PW (30%)	= 224 578.58

For N

$$PW = -500{,}000 + 120{,}000\left[\frac{1.1^6-1}{1.1^6 \times 0.1}\right] + 80{,}000 \times 1.1^{-6} \times x$$

PW (−30%)	= 54241.82
−20	= 5 8757.61
−10	= 63273.40
0	= 67789.19
10	= 72304.98
20	= 76820.78
30	= 81336.57

for useful life

$$PW = -500{,}000 + 120{,}000 \left[\frac{1.1^{6} - 1}{1.1^{6} \times 0.1}\right]$$

$$+ 80{,}000 \times 1.1^{-6} \quad \text{---} \quad \text{2 d.p change}$$

PW (-30%) = −50531.18

-20% = −8815.38

-10 = 30581

0 = 67789.19

+10 = 102928.55

+20 = 136114.80

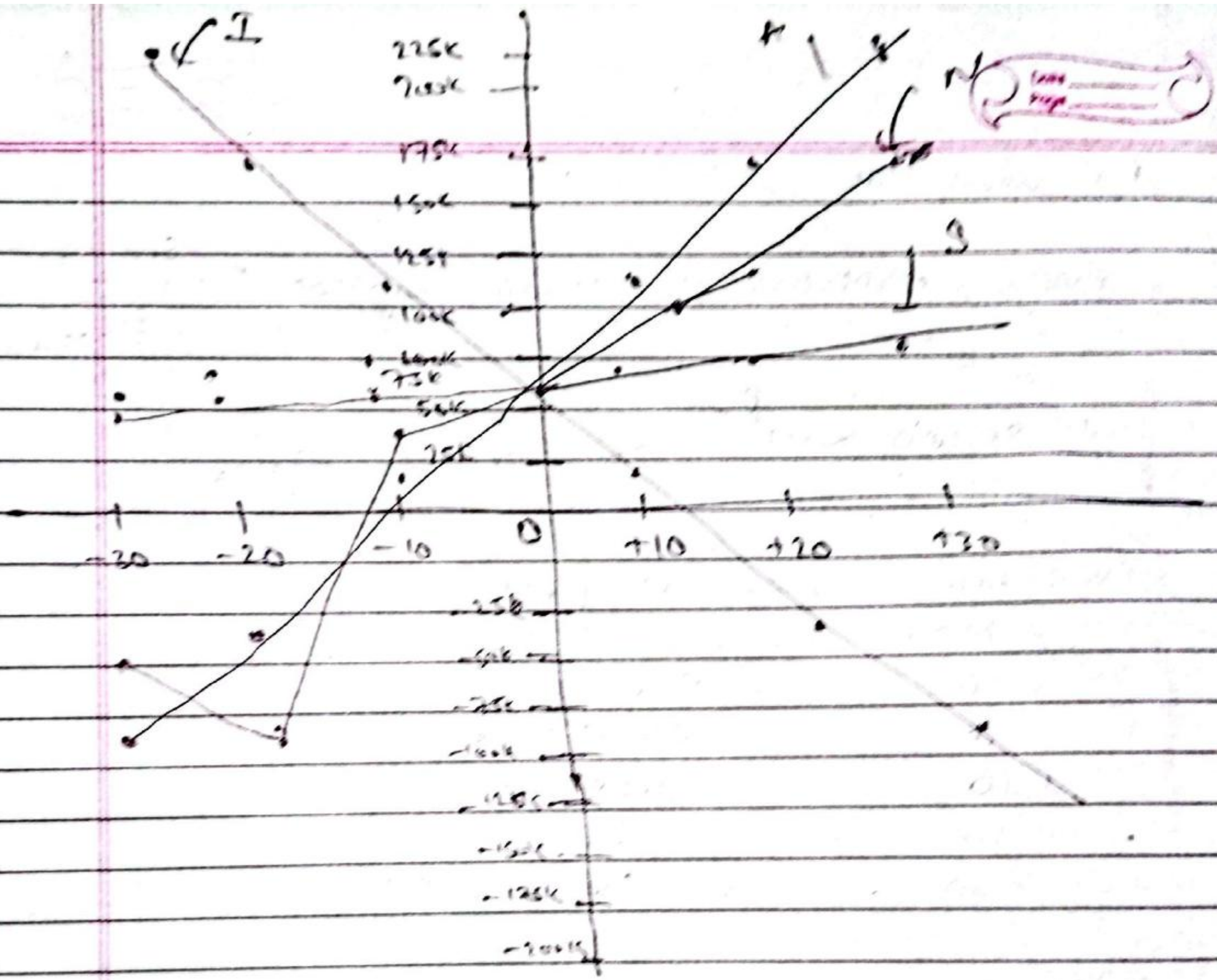
+30 = 167436.512

NOW,

PW

	-30%	-20%	-10%	0%	10%	20%	30%
I	21789.19	167789.19	117789.19	67789.19			
A							
S							
N							

fill all table



→ Slope badi jun huncha tyo steep and 'more' sensitive =

(Aw garda esay hola
kinaki value ali ma
aaucha)

Breakeven Analysis

→ is the point at which revenue is exactly equal to cost

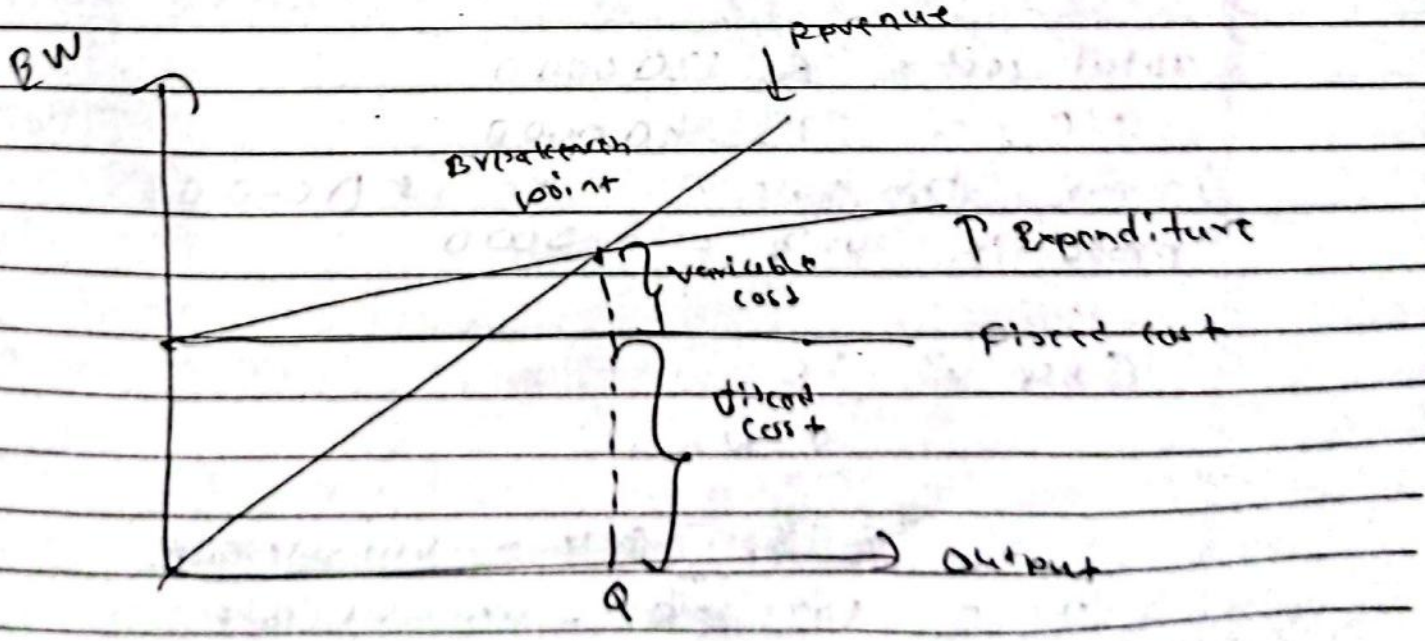
→ The main objective of breakeven analysis is to find out the condition of no loss and no gain

Let's be the SP per unit (v) be the variable cost per unit FC is fixed cost per unit's Q, quantity of production

Total sales = S * Q — (i)

Total cost = variable cost + Fixed cost

TC = V * Q + FC — (ii).



Total cost = Total sales

variable cost + Fixed cost = S × Q.

$FC = S \times Q - V \times Q$

$Q = \frac{FC}{S - V}$

$Q_{BEP} = \frac{FC}{S - V}$ (units)

Calculate breakeven volume of a cable manufacturing company from the following data.

Total cost = Rs 1200000
VC = Rs 400000
income from sale = Rs 1500000
production units = 5000

$Q_{BEP} = \frac{FC}{S - V}$

= ~~Total sales - variable cost~~

FC = Total cost - variable cost
= 1200000 - 400000
= Rs 800000

Selling price per unit (S) = $\frac{TS}{Q} = \frac{1500000}{5000}$

= Rs 300 / unit

Variable cost per unit (V) = $\frac{VC}{Q} = \frac{400000}{5000}$

= Rs 80 / unit

$Q_{BEP} = \frac{800000}{300 - 80}$ = 3636.3 units #

If 20W CFL bulb price is Rs 280 and 100W filament bulb is Rs 30 at market but their lighting power is equal, which bulb do you prefer to use in your house which electricity cost is Rs 12 per unit.

Soln:

For CFL

I = Rs 280

Cost = $\frac{20}{1000}$ (W to kW) × hrs × 12

= 0.24x

For filament

I = Rs 30

Cost = $\frac{100}{1000}$ × hrs × 12

= 1.2x

Total cost
$= 280 + 0.24x$

Total cost
$= 30 + 1.2x$

At BEP

$280 + 0.24x = 30 + 1.2x$

$280 - 30 = 1.2x - 0.24x$

$x = 260.42$ hrs

(~~do not put values~~ in total cost
cost nikaleka na haha)

(cost of CFL will be lower so
we will use CFL)

Use of BE principle while comparing two alternatives

$EW_A = f_1(y)$ $EW_B = f_2(y)$

y = a common factor whr both alternatives are dependent.

At BEP

$PW_A = PW_B$

$f_1(y) = f_2(y)$

Solve for y.

Suppose that there are two alternative electric motors that provide 100 HP O/P.

item	motor A	motor B
P.C	125000	160000
η	74%	92%
M.C	5000 per year	2500 per year
n	10	10
Annual tax	1.5% of I	1.5% of I
MARR	15%	15%

(a) How many hours per year would the motors have to be operated at full load for the annual cost to be equal, If the electricity cost is Rs 5kW/hr.

(b) If annual operation is more than 55 hrs, which motor should be selected?

(AC)

for motor A

$CR = 125000 (A/P, 9\%, N) - 0$

$= 24906.5$

Maintenance cost = ₹ 5000

Annual tax and insurance = 1.5 % of 125000
= 1875

Operating expense for power

$\eta = \frac{O/P}{I/P}$

I/P → be num of hrs of operation per year

$\left(\frac{O/P}{\eta}\right)$ → 100 HP

Operating Expense = Input × rate × hrs

$= \frac{100 \times 0.746 \text{ kW}}{0.74} \times 5 \times x$

$= 504.5x$

Total annual cost of motor A
$= 24906.5 + 5000 + 1875 + 504.5x$

for motor B

CR = 160000 (A|P, 9%, N) − 0

= 2603.92 ~~26039.25~~

31880.33

MC = 2500

Annual tax x = 2400

$\eta = \frac{o/p}{i/p}$

operating expense = Input × rate × hrs

= ~~0.8~~ $\frac{10 \times 0.746}{0.92}$ (kW) × 5 × x

= 405.43x

annual equivalent of cost of B

= 36780.33 + 405.43x

at BEP

$(AW)_A = (AW)_B$

31781.5 + 504.5x = 36780.33 + 405.43x

99.07x = 4998.83

x = 50.457

x = 51 hr

→ If annual operation is more than 53 hrs then motor B is selected due to less operating expenses.

Scenario Analysis

→ A procedure of comparing a "base case" to one or more additional scenarios such as best and worst cases to identify the extreme and most likely prospect outcomes.

① Best scenario → high demand, high selling price, low variable cost and so on.

② Normal Normal scenario → Average demand, average selling price average variable cost and so on.

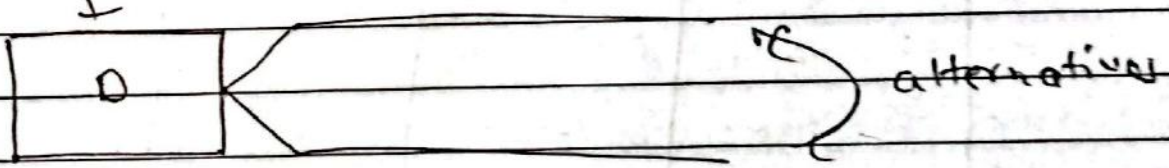
③ worst scenario → low demand, low selling price and high variable cost and so on.

Decision Tree and Sequential Investment Decision

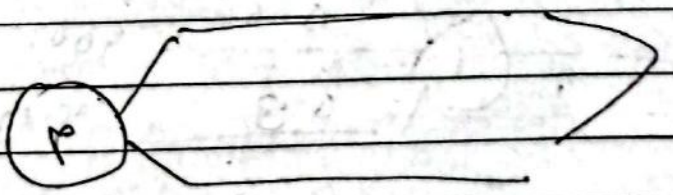
- A decision tree is a graphical device that shows a sequence of strategic decisions and the expected consequences under each possible set of circumstances
- It is constructed from left to right and includes each possible decisions and outcomes.

Components of Decision Tree

1. Decision Node



2. probability node



4. Probability tree approach

- Graphic or tabular approach for organizing the possible cash-flow streams generated by an investment.

#

A company establishing 3 sell branches each will have establishment cost of Rs 90000. From the preliminary survey following data are obtained. Determine the best decision.

Sell branch 1		Sell branch 2		Sell branch 3	
Prob	Income	prob	Income	Prob.	Income
0.1	4000	0.35	9000	0.1	5000
0.6	4000	0.4	6000	0.5	1000
0.3	9000	0.25	3000	0.4	7000

Soln:

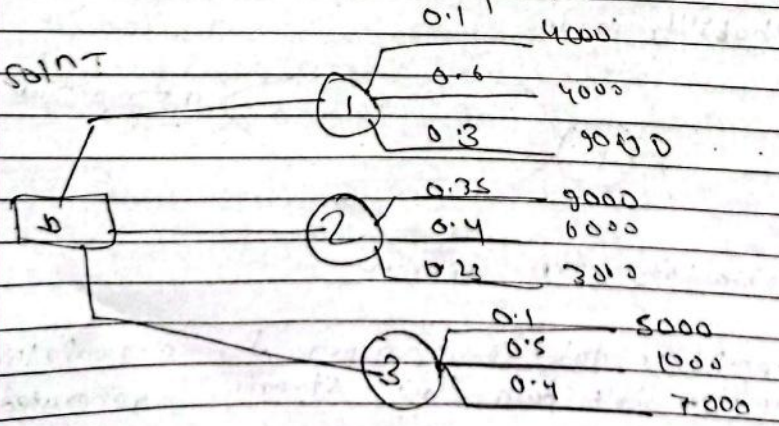


Fig: Decision Tree

Branch 1

P

I

Expected return

Total = 4000 +

Branch 2

Total =

Branch 3

Total =

(Sell branch 2

900 split br

A leathmandy Bu
possibility of e
of the two possi
Palitpur are bas
analysis of

Branch 1

P	0.1	0.6	0.3
I	4000	4000	9000
Expected return	400	2400	2700

Total = 400 + 2400 + 2700 = 5500

Branch 2

Total = 6300

Branch 3

Total = 3800

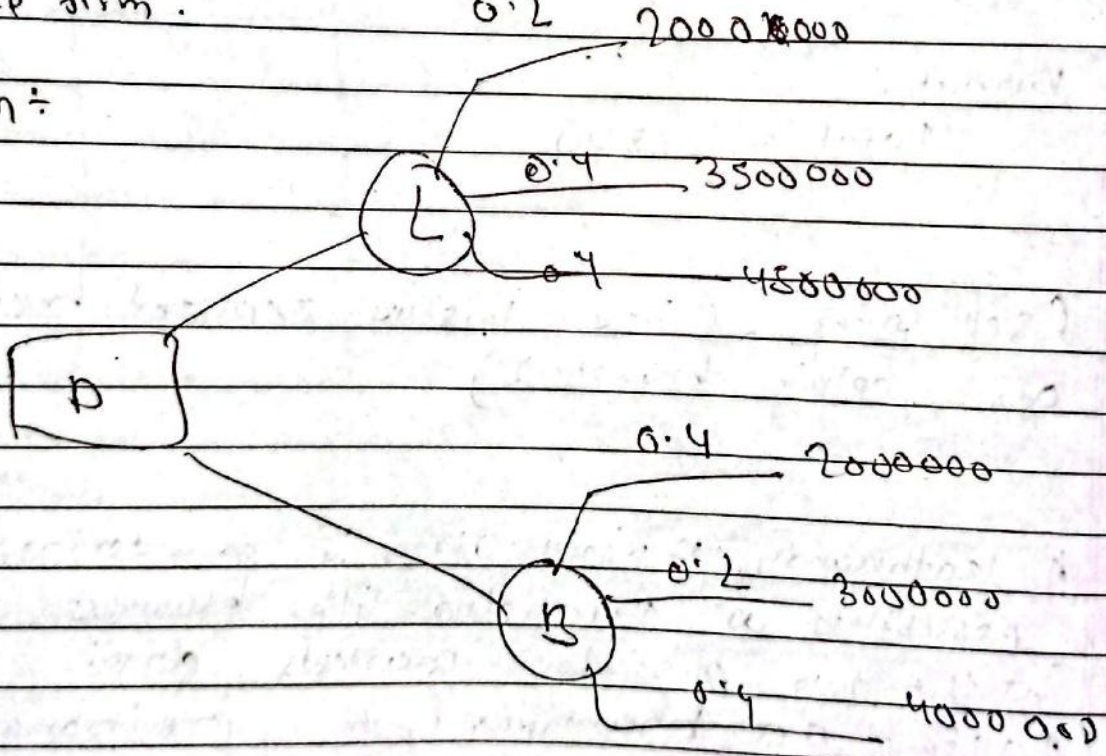
(Split branch 1 has highest expected return as split branch 2)

A leathmandy Business firm is considering the possibility of expanding it's business to one of the two possible markets areas Palitpur are bhaktapur. A preliminary analysis of the data is shown as :-

	Lalitpur probability	(000) profit	Bhaktapur Prob	(000) profit
Low success	0.2	2000	0.4	2000
medium	0.4	3500	0.2	3000
High	0.4	4500	0.4	4000

The cost of advertising Lalitpur is Rs 200,000 and for Bhaktapur is 150,000. Find out which market should be targeted by the firm.

Soln:



ER of L = 3600000

ER of B = 3000000

Now,
Sub the cost for adv

profit
at L = 3600000 − 200,000
= 3400000

profit
at B = 3000000 − 150,000
= 2850000

R at L is more so we should choose lalitpur.

A company produces a product whose FC and TC are 40,000 and Rs 85,000 ,
TS = 1,05,000 and Sale volume q = 15,000

Find BEP in Units
What should be the output if desired profit is Rs 50,000

soln:-

$Q_{BEP} = \frac{FC}{S-V}$ (units) $= \frac{40,000}{8/3} = 15,000$

~~= 40,000~~

$FC = Q(S-V)$ $(S-V) = \frac{FC}{Q}$

$= \frac{FC}{Q}$ $S-V = 8/3$

$$Q_{BEP} = \frac{FC}{S - V}$$

$$S = \frac{TS}{Q} = 7 \qquad V = \frac{VC}{Q} = \frac{45000}{15000}$$

$$= 3$$

$$TC = FC + VC$$

$$VC = TC - FC$$

$$= 45,000$$

$$Q_{BEP} = \frac{40,000}{7 - 3} = 10,000 \text{ units}$$

$$\text{profit} = TS - TC$$

$$50,000 = 105000\,Q \cdot S - (FC + VC)$$

$$50,000 = Q \cdot 7 - (40,000 + VV \cdot Q)$$

$$50,000 = 7Q - 40,000 - 3Q$$

$$90,000 = 4Q$$

$$Q = 22500 \quad \#$$

1 hp = 0.746 kW