iZenBridge's –PMP® Math-Flash Card

1

Topics

1. Project Selection
2. Earned Value
3. Time Management
4. Communication
5. Procurement

2

Project Selection

Present Value

Value today of the future cash flow , so if the money is coming after 4 years we need to discount it to calculate the value of today.

Present Value = FV / (1 + i)^ n

i = discount rate

n = period

FV = Future Cash Inflow/ Outflow

Net Present Value (NPV)

NPV is a measure of how much money a project can be expected to return (in today's present value).
It's a Sum of Inflow and outflow in present value term (mean discounted based on duration)

5

Net Present Value (NPV)

NPV = Sum(FV / (1 + i)^ n)

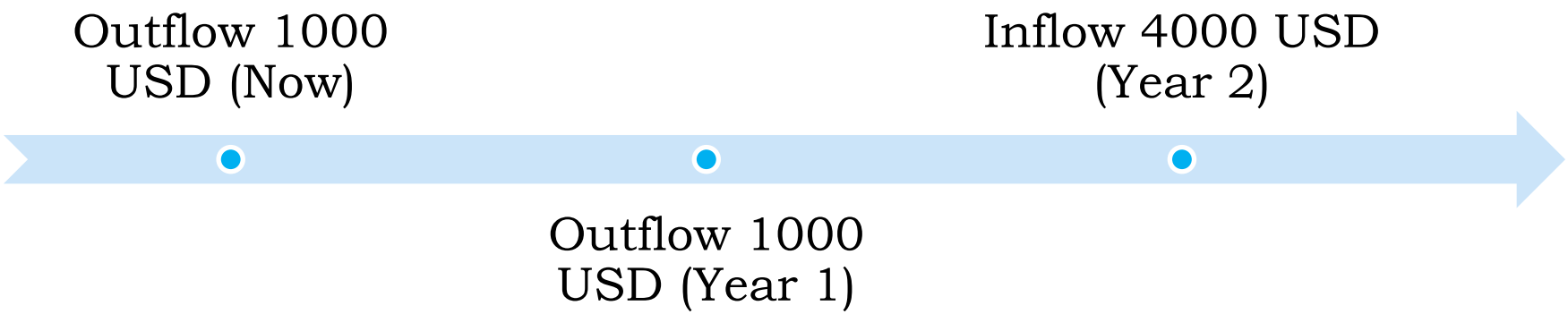
i = discount rate

n = period

FV = Future Cash Inflow/ Outflow

Inflow represented with + / Outflow with Negative

Net Present Value



Discount Rate = 10%

NPV = -1000-1000 /((1+10/100)^1)
+ 4000/((1+10/100)^2)

= -1000 – 909 +3306

= 1397

Net Present Value (NPV)

Bigger is better - Bada Hai To Behtar Hai – BHTBH ☺

8

NPV (Net Present Value)

Time value of money taken care.
Money you get in 5 years isn’t worth as money you get today

9

Which Project to Select?

Project A has a duration of 4 years and an NPV of $40,000,
Project B has a duration of 3 years and an NPV of $45,000,
Project C has a duration of 6 years and an NPV of $62,000 Which project will you select?

Time value of money already considered in NPV so years doesn't matter
Remember BHTBH – **Project C**

Internal Rate of Return (IRR)

IRR is a measure of how quickly the money invested in a project will increase in value. It's a rate of return which calculate based on inflow and outflow of the project.

IRR (Internal Rate of Return)

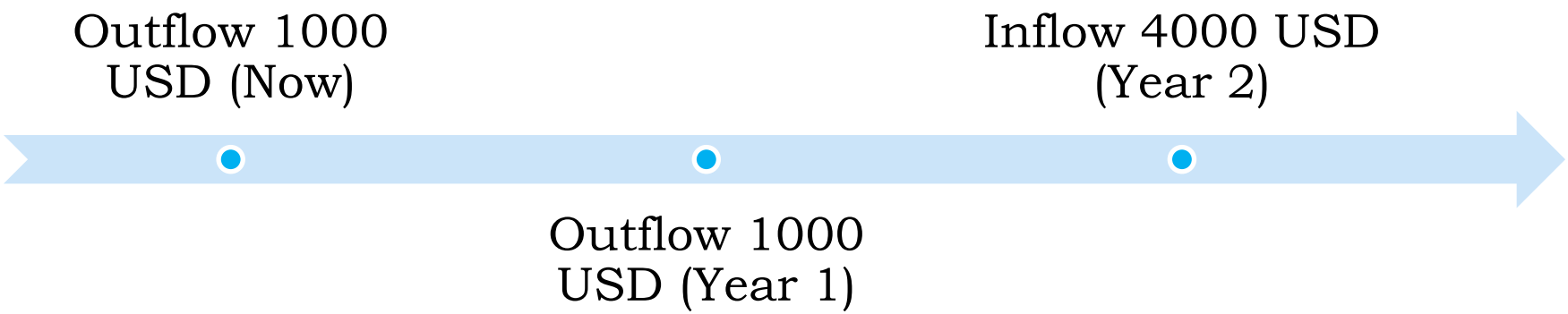
- The formula is same like NPV, the difference is now we need to calculate rate (i) which equalizes the cash inflow and outflow

$$0 = \text{Sum}(FV / (1 + i)^{\wedge} n)$$

i = IRR **this is what we calculate**

n = period

Internal Rate of Return (IRR)



$$0 = -1000 - 1000 / ((1+i/100)^1) + 4000/((1+i/100)^2)$$

If we put i = 56 , it makes the equation balance, so in this case IRR = 56%

IRR

Bigger is better - Bada Hai To Behtar Hai – BHTBH ☺

IRR (Internal Rate of Return)

Which Project you will select?

Project Name	IRR	Investment
Gold	6%	4,500,000
Silver	5.8%	1,700,000
Platinum	5.4 %	2,000,000
Copper	3%	1,000,000

Project Gold (BHTBH ☺)

NPV / IRR

NPV represents the project benefit in absolute term like 100,000 USD

IRR represent the value in proportion like 10% , 56%

We can get contradictory recommendations from NPV and IRR but in exam you do not get such questions

Benefit Cost Ratio

Money project going to make versus its cost.
Benefit/Cost OR Revenue/cost

Remember : Revenue is not equals to Profit

BCR (Benefit Cost Ratio)

Greater Benefit<->Greater Ratio <-> Better project

Cost Benefit ratio

- Cost / Benefit or 1 / Benefit Cost Ratio

BCR (Benefit Cost Ratio)

Which of the following projects do you select?

A) Project Gold with a BCR of 0.9
B) Project Silver with a CBR of 0.9 and cost of $100,000
C) Project Diamond with a cost of $100,000 and benefits of $110,000
D) Project Platinum with a BCR of 1.2

a) 0.9 b) bcr = 1/0.9 = 1.11 c) 11/10 = 1.1 d) 1.2

BHTBH ☺ **Ans: D**

Payback Period

Time required to get originally invested amount back

Smaller is better ☺. Earlier we get money, better it is

Project Selection

Depreciation – Rate at which project losses value.

Depreciation - Straight Line

The same amount of depreciation taken each year

For a company car that has a projected life of 5 years which You purchased for £17,000 and you expect that you will be able to sell the car at the end of the 5 years for £2,000. How much is the straight line depreciation of this car in the 3rd year?

Total to depreciate = 17000 – 2000 = £15,000
Depreciation each year = 15000/5 = £3,000

Ans: £3000, Depreciation will be same every year

Scrap Value

Value left after completion of total age

Life Cycle Cost

Total life time cost of project (Development + Support), cost from start to end.

25

Project Selection

Opportunity Cost – Money could have been made by project not selected out of 2 projects

Opportunity Cost

What we loose is what we might have got

Among Cadbury and Kit Kat, if we choose Cadbury, Kit Kat is the opportunity cost ☺. Generally we will eat both when it is chocolate

27

Earned Value

Earned Value Management

- Technique used to measure how project is doing compared to plan

- Uses lot of EV formulas

Earned Value Management

- Project: Children Play area in apartment complex. Total money we have is INR 50,000. Total duration is 6 months. Total planned work of 1000 hours

Earned Value

- **Earned Value (EV)** – Budgeted cost of work performed

- How much work was actually completed during a given period of time

Earned Value

- E.g. for 300 hours of planned work, team completed 350 actually
  EV% = 350/1000 = 35%

- EV = BAC*35% = 50,000*0.35 = 17,500

Actual Cost

- **Actual Cost (AC)** – Actual cost of work performed

- Actual money spent during a given period of time. E.g. after 300 hours of work, assume AC = 16,000

Schedule Variance

- **Schedule Variance (SV)** – Difference between where we planned to be in the schedule (PV) and where we are in the schedule (EV)

Schedule Variance

- SV = EV – PV = 17500 – 15000 = 2500

- If we earned **more or less** than planned we are having schedule variance

Schedule Variance

- +ve SV ahead of schedule (+2500)
- -ve SV behind schedule
- Bigger the value, more the variance

Schedule Performance Index (SPI)

- Rate at which the project performance is meeting schedule expectations during a given period of time

Schedule Performance Index (SPI)

- SPI = EV/PV. 17500/15000 = 1.16
- If we earned more than planned we are ahead

Schedule Performance Index (SPI)

- > 1 SPI ahead of schedule (1.16)
- < 1 SPI behind schedule
- = 1 SPI on schedule

Cost Variance

- **Cost Variance (CV)** – Difference between what we expected to spend (EV) and what we actually spent (AC)

Cost Variance

- CV = EV – AC = 175,00 – 16000=1500
- If we earned more or less than actual money spent we are having variance

Cost Variance

- +ve CV Under budget (+1500)
- -ve CV Over budget
- Bigger the value, more the variance

Cost Performance Index (CPI)

- Rate at which the project performance is meeting cost expectations during a given period of time

Cost Performance Index (CPI)

- CPI = EV/AC. 17500/16000 = 1.09
- If we earned more than actual spent we are under budget

Cost Performance Index (CPI)

- > 1 CPI under budget (1.09)
- < 1 CPI Over budget
- = 1 CPI on budget

Estimate to Complete (ETC)

- Projects how much more we will spend on the project, based on past performance

- ETC = EAC(Estimate at Completion) - AC

Estimate at Completion (EAC)

- Projects the total cost at completion based on performance up to a point in time

Estimate at Completion (EAC)

- EAC = BAC/CPI = 50,000/1.09 = 45871
- When variance is expected at constant rate (CPI) or
- There is no variance (CPI=1)

Estimate at Completion (EAC)

- EAC = AC+ETC(Estimate to Complete), when
- Original estimate not viable and ETC calculated freshly

Estimate at Completion (EAC)

- EAC = AC+(BAC-EV), when

- Current variances are exceptions, atypical, one time variation

Estimate at Completion (EAC)

- Current variances are exceptions, atypical, one time variation
- EAC = AC+(BAC-EV)
- EAC = 16000+(50000-17500) = 48,500

Estimate at Completion (EAC)

- EAC = AC+(BAC-EV)/CPI, when
- Current variances are expected to recur, Typical

Estimate at Completion (EAC)

- Current variances are expected to recur, Typical
- EAC = AC+(BAC-EV)/CPI
- EAC = 16000+(50000-17500)/1.09 = 45816

Variance at Completion (VAC)

- Difference between what was budgeted and what will actually be spent

Variance at Completion (VAC)

- VAC = BAC – EAC = 50000-45871 = 4129

Variance at Completion (VAC)

- +ve value means planned is more than actual. (+4129)
- -ve value means planned is less than actual.
- Bigger the value, more the variance

To Complete performance Index (TCPI)

- **To Complete Performance Index (TCPI)-**

- Performance that must be achieved in order to meet financial or schedule goals

To Complete performance Index (TCPI)

- TCPI = (BAC – EV)/(BAC – AC), when
- Project is on budget and BAC is viable

To Complete performance Index (TCPI)

- TCPI = (BAC – EV)/(BAC – AC) = 50000-17500/50000-16000 = 0.955

To Complete performance Index (TCPI)

- TCPI = (BAC – EV)/(EAC – AC)
- When project expected to over/under budget and BAC is no more viable

To Complete performance Index (TCPI)

- TCPI = (BAC – EV)/(EAC – AC) = 50000-17500/45871-16000 = 32500/29871 = 1.088

Time Management

PERT

- Project Evaluation Review Technique (PERT) -
- Most common technique for 3-point estimation
- Start with 3 estimates, Pessimistic(P), Optimistic(O) and Most likely(M)

PERT

- Pessimistic(P) & Optimistic(O)are less likely to happen therefore normal estimate (M) weightage is 4 times
- P+4M+O/6

PERT

- Standard Deviation (SD) of PERT activity = P-O/6

PERT

- Variance of a PERT activity |P-O/6|

Float

- Float/Slack is the time for which the activity can be delayed before delaying project
- Float = Late Start – Early Start Or
- = Late Finish – Early Finish

Critical Path

- String of activities that if added for its duration is longer than any other path in n/w diagram

Critical Path

- Float/Slack is the time for which the activity can be delayed before delaying project
- Float of an activity on critical path is Zero

Communication Management

Communication Channels

- N(N-1)/2
- N = number of people

Communication Channels

- E.g.
- PM having 5 team members. How many comm. Channels
- N = 6 (5+PM), 6*5/2 = 15

Communication Channels

- E.g.
- PM having 5 team members. If number of team members reduced to 2, how many communication channels left

- Old: N = 6 (5+PM), 6*5/2 = 15
- New: N=3, 3*2/2 = 3
- Ans: 3

Communication Channels

- E.g.
- PM having 5 team members. If number of team members reduced to 2, how many communication channels reduced

- Old - N = 6 (5+PM), 6*5/2 = 15
- New – N=3, 3*2/2 = 3
- Difference 15-3 = 12

Procurement Management

Point of Total Assumption (PTA)

- Refers to amount above which seller bears all the loss of cost overrun
- Cost goes above PTA are assumed due to mismanagement and therefore entitled to seller

Point of Total Assumption (PTA)

- PTA = Target Cost + (Ceiling Price -Target Price)/Buyer's share ratio

Make or Buy

- Make-or-Buy decision (also called the outsourcing decision) is a judgment made by management whether to make a component internally or buy it from the market.
- Always go by the option where cost is less.

Saket Bansal

iZenBridge Consultancy P. Ltd.

Saket.Bansal@iZenBridge.com