GE 403
Engineering Economy

Eng. Howaidi Alotaibi

Civil Engineering Department

E-mail halshaibani@ksu.edu.sa

Ex.1 DuraTech Manufacturing is evaluating a process improvement project. The estimated receipts and disbursements associated with the project are shown below. MARR is 10 percent/year. Should DuraTech implement the proposed process improvement **based on present worth**?

EOY	0	1	2	3	4	5
Receipts	$0	$600	$600	$700	$700	$700
Disbursements	$1000	$300	$300	$300	$300	$300

Solution

Pw = -1000 + 300 (P/A 10%, 5) + 100 (P/A 10%, 3)(P/F 10%, 2)

Pw = -1000 + 300 (3.79079) + 100 (2.48685)(0.82645) = $342.76

Since Pw > 0, the proposed process improvement should be implemented.

Ex.2 The engineering team at a company is planning to purchase an enterprise resource planning (ERP) system. The software and installation from Vendor **A** costs **$380,000** initially and is expected to increase revenue **$125,000** per year every year. The software and installation from Vendor **B** costs **$280,000** and is expected to increase revenue **$95,000** per year. The company uses a 4-year planning horizon and a 10 percent per year MARR. (The "do nothing" alternative is feasible and assumed to have a Pw of $0.) Which ERP system should be purchased based on ranking and incremental present worth analyses?

Solution

DN

Alt B

Alt A

Ranking Approach

$Pw)_{DN} = \$0$

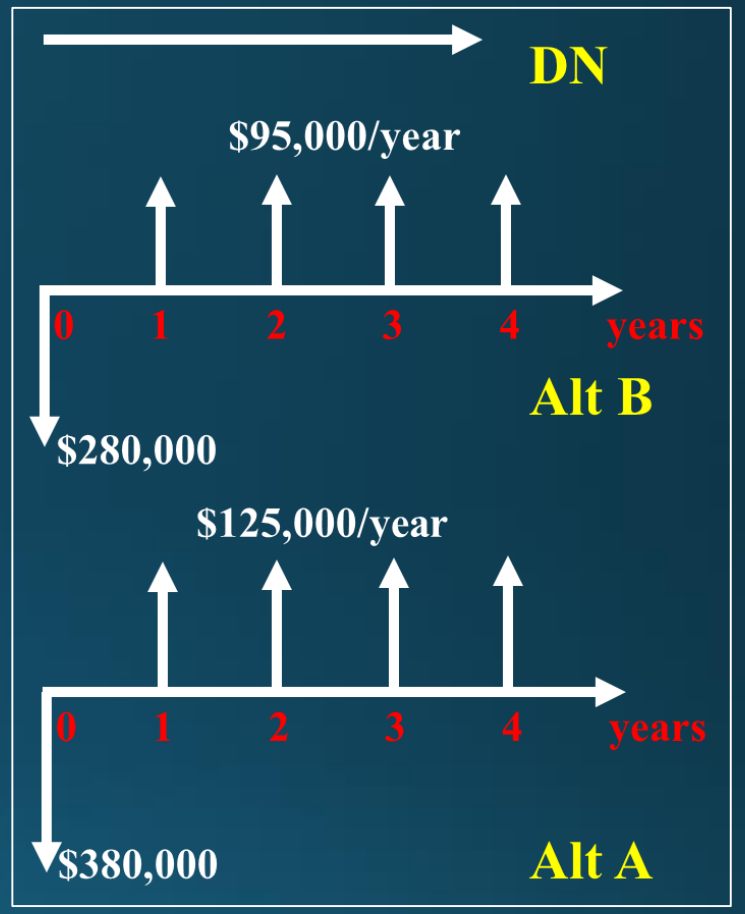
$Pw)_{B} = -280,000 + 95,000(P/A\ 10\%, 4) = -280,000 + 95,000(3.16987) = \$21137.65$

$Pw)_{A} = -380,000 + 125,000(P/A\ 10\%, 4) = -380,000 + 125,000(3.16987) = \$16233.75$

Solution

Incremental Approach

- Order alternatives from lowest to highest initial investment
- Determine incremental cash flows between alternatives
- Calculate Pw on incremental cash flows

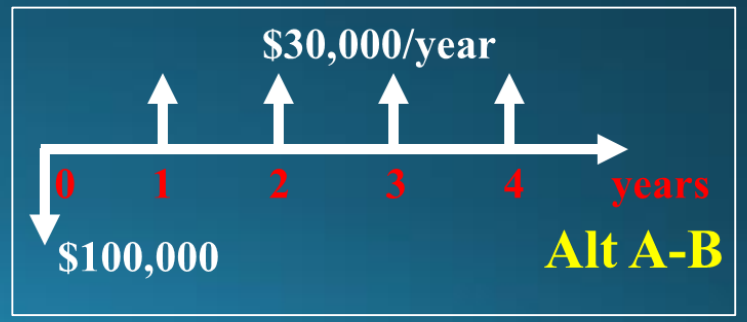


$Pw)_{B–DN}$ = -280,000 + 95,000(P/A 10%, 4) = $21137.65

Pw > $0, therefore B is better than doing nothing

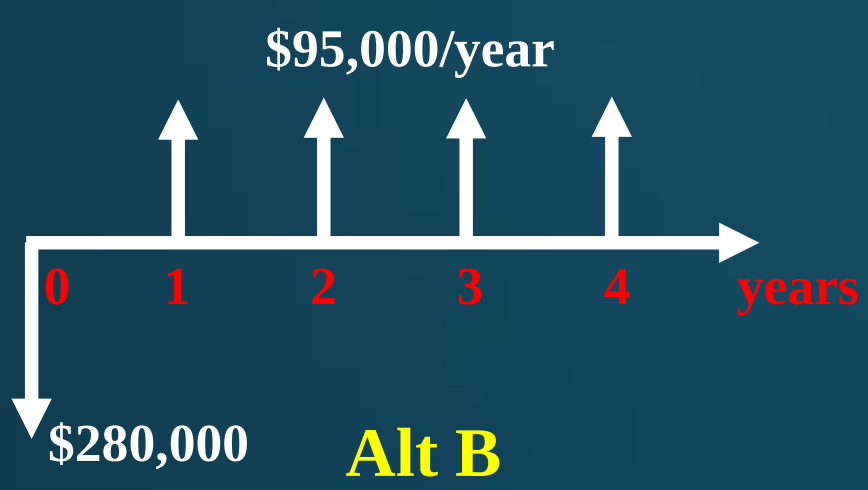
$Pw)_{A-B}$ = -100,000 + 30,000(P/A 10%, 4) = -$4903.9

Pw < $0, therefore B is better than A



Ex.3 The engineering team at a company is planning to purchase an enterprise resource planning (ERP) system. The software and installation from Vendor **A** costs **$380,000** initially and is expected to increase revenue **$125,000** per year every year. The software and installation from Vendor **B** costs **$280,000** and is expected to increase revenue **$95,000** per year. The company uses a 4-year planning horizon and a 10 percent per year MARR. Which ERP system should be purchased based on DPBP and PBP methods?

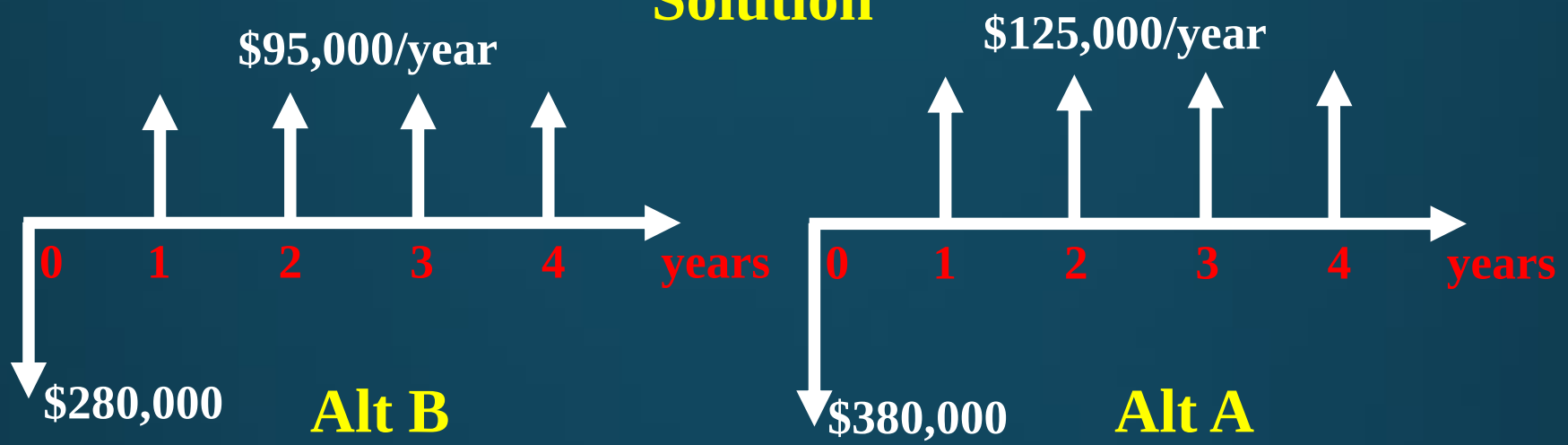
Solution



PBP method

EOY	CF Alt B	CumCF Alt B	CF Alt A	CumCF Alt A
0	-280,000	-280,000	-380,000	-380,000
1	95,000	-185,000	125,000	-255,000
2	95,000	-90,000	125,000	-130,000
3	95,000	5,000	125,000	-5,000
4	95,000	100,000	125,000	120,000
PBP	$2 + \frac{90,000}{95,000} = 2.95$ years		$3 + \frac{5,000}{125,000} = 3.04$ years	

Solution



DPBP method

$Pw)_B$ = -280,000 + 95,000(P/A 10%, DPBP) = 0 $\Longrightarrow$ (P/A 10%, DPBP)=2.9473

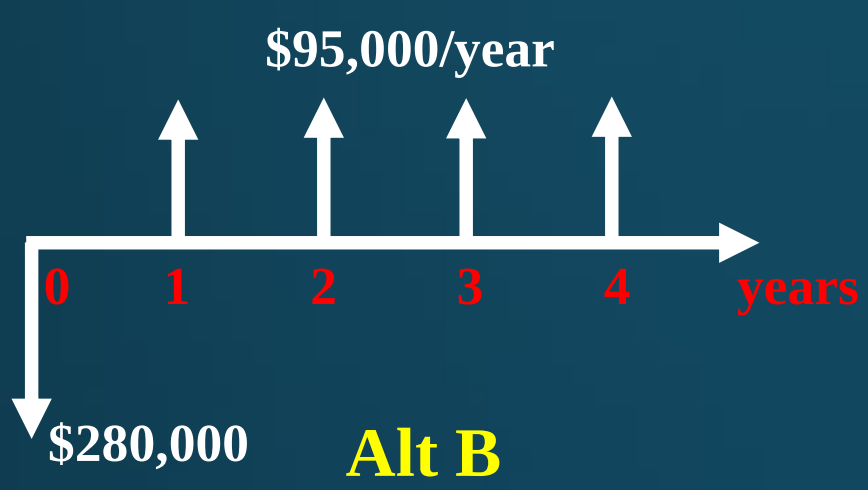
OR $=A\left[\frac{(1+i)^n-1}{i(1+i)^n}\right] = -280{,}000 + 95{,}000\left[\frac{(1+0.1)^n-1}{0.1(1+0.1)^n}\right] = 0 \Longrightarrow n = 3.66$

$Pw)_A$ = -380,000 + 125,000(P/A 10%, DPBP) = 0 $\Longrightarrow$ (P/A 10%, DPBP)=3.04

OR $=A\left[\frac{(1+i)^n-1}{i(1+i)^n}\right] = -380{,}000 + 125{,}000\left[\frac{(1+0.1)^n-1}{0.1(1+0.1)^n}\right] = 0 \Longrightarrow n = 3.8$

n	To Find P Given A $(P\|A\ i\%,n)$
1	0.90909
2	1.73554
3	2.48685
4	3.16987
5	3.79079

Solution



DPBP method

EOY	CF Alt B	Cum(Pw) Alt B	CF Alt A	Cum(Pw) Alt A
0	-280,000	-280,000.00	-380,000	-380,000.00
1	95,000	-193,636.45	125,000	-266,363.75
2	95,000	-115,123.70	125,000	-163,057.50
3	95,000	-43,749.25	125,000	-69,143.75
4	95,000	21,137.65	125,000	16,233.75

By interpolation

DPBP =3.67 ⟵ DPBP =3.81

The END