Life-Cycle Cost Analysis

Example

Q1) To compare the life cycle costs of the following types of lift to an office, whose life is 40 years. The rate of interest allowed is 4% per annum compound. (n) (i)

(Assume that the maintenance cost & replacement cost are charged at the end of each year)

(A) Lift A will cost $1,200,000, will require a maintainence cost of $50,000 every year and require to replace the lifting motor, strand and control panel after 20 years at a cost of $800,000

Life-cycle costs of Lift A

	$
1 Initial cost	1,200,000
2 Present value of maintance cost at 4% for 40 years:	
= $50,000 x [(1 + 0.04)^{40} - 1] / [0.04 x (1+ 0.04)^{40}]	989,639
3 Replacement of lift motor, strand and control panel after 20 years:	
= $800,000 / (1+0.04)^{20}	365,110
Total life-cycle cost at present value for Lift A:	2,554,748

* ib interest rate is compounded per month → then "n" will be no. of month instead of year.

Present value of $1 payable at regular intervals: $[(1+i)^n-1]/[i(1+i)^n]$

Present value of $1: $1/(1+i)^n$

(B) Lift B will cost $1,700,000, will require a maintainence cost of $30,000 every year and require to replace the lifting motor, strand and control panel after 25 years at a cost of $600,000

* Consider the TPI if use old-day data.

Life-cycle costs of Lift B

	$
1 Initial cost	1,700,000
2 Present value of maintance cost at 4% for 40 years:	
= $30,000 x [(1 + 0.04)^{40} - 1] / [0.04 x (1+ 0.04)^{40}]	
3 Replacement of lift motor, strand and control panel after 25 years:	
= $600,000 / (1+ 0.04)^{25}	225,070
Total life-cycle cost at present value for Lift B:	2,518,853

Present value of $1 payable at regular intervals: $[(1+i)^n-1]/[i(1+i)^n]$

Present value of $1: $1/(1+i)^n$

Conclusion

~~Verdict:~~ **Lift B is more economic than Lift A**

Q2) What if the interest rate change to 5%? ← Interest rate may also affect the LCC analyses.

Life-cycle costs of Lift A

	$
1 Initial cost	1,200,000
2 Present value of maintance cost at 5% for 40 years:	
= $50,000 x [(1 + 0.05)^{40} - 1] / [0.05 x (1+ 0.05)^{40}]	
3 Replacement of lift motor, strand and control panel after 20 years:	
= $800,000 / (1+ 0.05)^{20}	301,512
Total life-cycle cost at present value for Lift A:	2,359,466

Present value of $1 payable at regular intervals: $[(1+i)^n-1]/[i(1+i)^n]$

Present value of $1: $1/(1+i)^n$

Life-cycle costs of Lift B

	$
1 Initial cost	1,700,000
2 Present value of maintance cost at 5% for 40 years:	
= $30,000 x [(1 + 0.05)^{40} - 1] / [0.05 x (1+ 0.05)^{40}]	514,773
3 Replacement of lift motor, strand and control panel after 25 years:	
= $600,000 / (1+ 0.05)^{25}	177,182
Total life-cycle cost at present value for Lift B:	2,391,954

Present value of $1 payable at regular intervals: $[(1+i)^n-1]/[i(1+i)^n]$

Present value of $1: $1/(1+i)^n$

Verdict: **Lift A is more economic than Lift B**