Benefit–Cost Ratio and Net Present Value

Conventional and modified benefit–cost ratios and net present value from first cost, annual benefits and costs, salvage value, rate and life.

Method: Benefit–cost analysis

Input parameters

Unit system: SI

Parameter	Value	Unit
Initial cost	2,500,000	
Annual benefit	520,000	
Annual operating and maintenance cost	140,000	
Salvage value at the end	200,000	
Discount rate	7.0000	%
Life in years	15.000	

Calculated results

Parameter	Value	Unit
Present worth of benefits	4,736,115	
Present worth of costs (less salvage)	3,702,619	
Conventional benefit–cost ratio	1.2791	
Modified benefit–cost ratio	1.4257	
Net present value	1,033,497	

Notes for this case

• Present worths use (P/A) for annual amounts and (P/F) = 1/(1 + i)^n for the salvage. Conventional B/C = PW(benefits)/PW(costs); modified B/C subtracts operating costs from benefits and divides by the net investment. Both exceed 1 exactly when NPV > 0, but they rank projects differently: compare mutually exclusive alternatives incrementally, not by the largest ratio.

Formula and method

$$B/C = \frac{B(P/A)}{I + C(P/A) - S(P/F)}, \quad B/C_{mod} = \frac{(B - C)(P/A)}{I - S(P/F)}$$

Variables

I	Initial cost	-
B	Annual benefit	-
C	Annual operating and maintenance cost	-
S	Salvage value at the end	-
i	Discount rate	-
n	Life in years	-
PW_B	Present worth of benefits	-
PW_C	Present worth of costs (less salvage)	-
B/C	Conventional benefit–cost ratio	-
B/C_{mod}	Modified benefit–cost ratio	-
NPV	Net present value	-

Method and standards

Benefit–cost.

Assumptions and limits

- End-of-year flows; constant rate; certain cash flows.

References

Benefit–cost analysis

Report details

Report reference	FCC-GT1Z-XQR3 (the same inputs always give the same reference)
Generated	23 November 2026, 17:51 UTC
Calculator	Benefit–Cost Ratio and Net Present Value
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/economics/benefit-cost-ratio

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.