

Answer on Question #74251, Economics / Microeconomics

Q. Zenith Manufacturing is considering the purchase of a new machine that would have to be paid for in annual payments of \$ 5000 at the end of each of the next four years. Having this machine would increase the firm's profits by \$ 2500 per year for the next 15 years. These profits also are received at the end of each year. If the interest rate is 10 percent should Zenith buy the machine?

Answer:

To evaluate this project, there is need to check the feasibility of making investment in a new machine for Zenith. For this purpose, NPV of this investment project is calculated using following formula:

$$NPV = \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \dots + \frac{C_T}{(1+r)^T} - C_0$$

Where,

$C_0 = 0$ (initial outlay)

T = 15 years

r = 10%

Then, NPV of project is:

$$\begin{aligned} NPV &= \frac{-5000 + 2500}{(1 + 0.10)^1} + \frac{-5000 + 2500}{(1 + 0.10)^2} + \frac{-5000 + 2500}{(1 + 0.10)^3} + \frac{-5000 + 2500}{(1 + 0.10)^4} + \frac{2500}{(1 + 0.10)^5} \\ &\quad + \frac{2500}{(1 + 0.10)^6} + \frac{2500}{(1 + 0.10)^7} + \frac{2500}{(1 + 0.10)^8} + \frac{2500}{(1 + 0.10)^9} + \frac{2500}{(1 + 0.10)^{10}} \\ &\quad + \frac{2500}{(1 + 0.10)^{11}} + \frac{2500}{(1 + 0.10)^{12}} + \frac{2500}{(1 + 0.10)^{13}} + \frac{2500}{(1 + 0.10)^{14}} + \frac{2500}{(1 + 0.10)^{15}} \\ &\quad - 0 \end{aligned}$$

$$\begin{aligned} NPV = & \frac{-2500}{(1.10)^1} + \frac{-2500}{(1.10)^2} + \frac{-2500}{(1.10)^3} + \frac{-2500}{(1.10)^4} + \frac{2500}{(1.10)^5} + \frac{2500}{(1.10)^6} + \frac{2500}{(1.10)^7} + \frac{2500}{(1.10)^8} \\ & + \frac{2500}{(1.10)^9} + \frac{2500}{(1.10)^{10}} + \frac{2500}{(1.10)^{11}} + \frac{2500}{(1.10)^{12}} + \frac{2500}{(1.10)^{13}} + \frac{2500}{(1.10)^{14}} + \frac{2500}{(1.10)^{15}} \\ & - 0 \end{aligned}$$

$$NPVA = \$3,165.87$$

NPV of this project is positive, so Zenith should buy the new machine.

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