Depreciation, Alternate Investment and Profitability Analysis.

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Lecture-15.

Alternative Investment – Incremental Rate of Return.

Welcome to the course Depreciation, Alternate Investment and Profitability Analysis. We are continuing with module 2, that is alternative investment. In this lecture I will cover a new alternate investment technique, that is called incremental rate of return. The incremental internal rate of return is an analysis which computes the fiscal return to an investor where there are two or more competing investment opportunities concerning different amounts of investments. The analysis is applied to the difference between the cost of the two investments.

In this method the cash flow connected with the cheapest alternative is subtracted from the cash flow associated with the more expensive alternative to arrive at a differential cash flow for different alternatives and then an internal rate of return analysis is conducted on this difference. Based on Johnston's quantitative analysis on, one selects the more expensive investment opportunity, if only it has an incremental internal rate of return higher than the acceptable minimum, acceptable rate of return that is MARR.

Through examples the above concept is demonstrated in this lecture. However, the above method is not free from weakness. There are qualitative issues such as whether there is an incremental increase in risk associated with the more expensive investment. Therefore, the investor must be advised to weigh a variety of factors besides just the incremental internal rate of return before making an investment decision.

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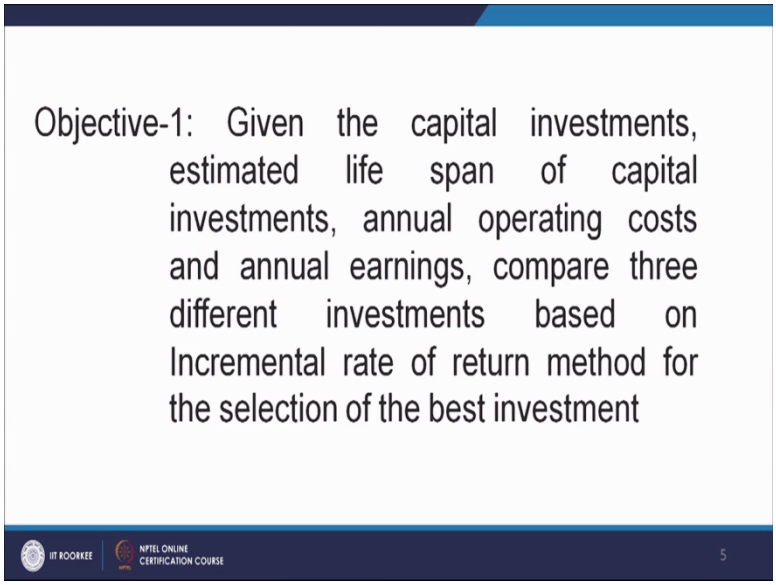

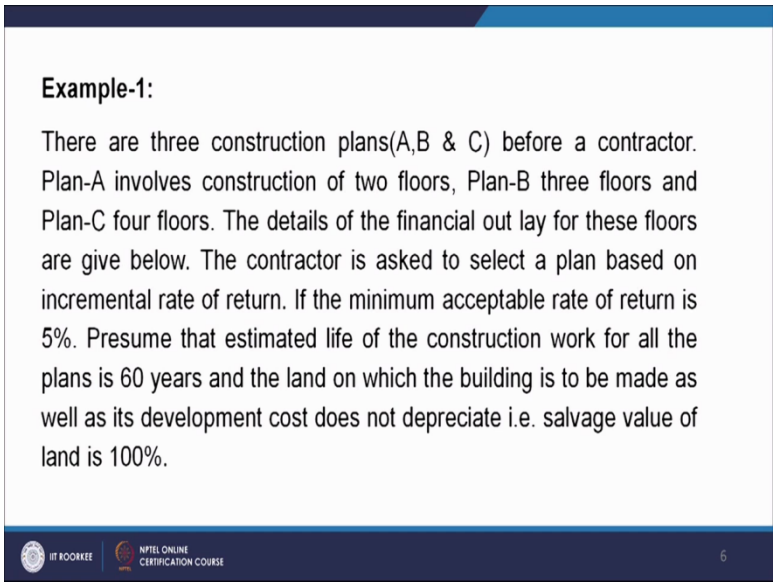

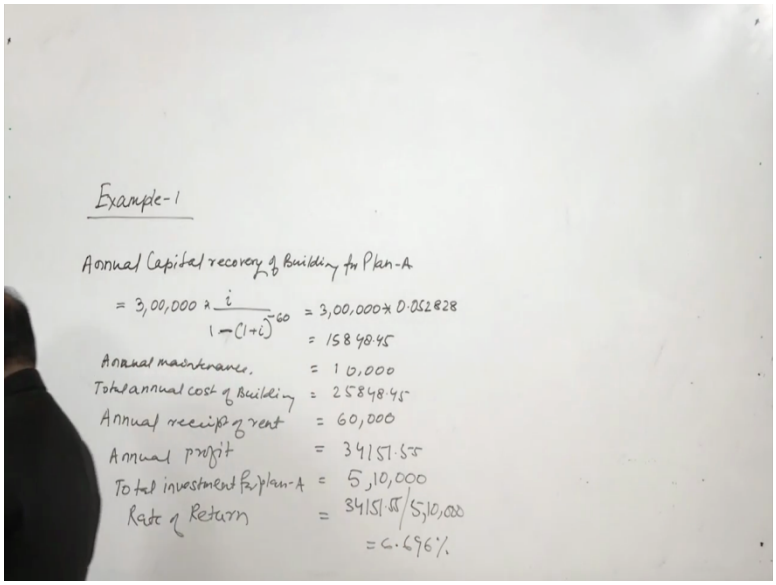

Now the objective is of the problem which we are going to see or example we are going to see is that, given the capital investment estimated life span of capital investments, annual operating costs and annual earnings, compare three different investments based on incremental rate of return method for the selection of the best investment.

This is a example number 1, the example number 1 tells that there are three construction plan A, B and C before a contractor. Plan A involves construction of two floors, plan B three floors and plan C four floors. The details of the financial layout of these floors are given below in the table, we will just see that table. The contractor is asked to select a plan based on incremental rate of return, if the minimum acceptable rate of return is 5 percent. Presume that estimated life of the construction work for all the plans is 60 years. And the land on which the building is to be made as well as its development cost does not depreciate.

That is salvage value of the land is 100 percent, now we see the table which gives the details of these plans. So let us calculate annual capital recovery of building for plan A, this will be 3,00,000 into i divided by 1 + 1 sorry 1 - 1 + i - 60, this comes out to be 3,00,000 into 0.052828, which comes out to be rupees 15848.45. Now annual maintenance is 10,000, so total annual cost of the building equal to this + this is 25848.45 as you get this + this is this. Annual receipt of rent is 60,000, so annual profit is this 60,000 - this value this comes out to be 34151.55. Now total investment for plan A is A is equal to 51 5,10,000, so rate of return equal to 34151.55 divided by 5,10,000 is equal to 6.696 percent.

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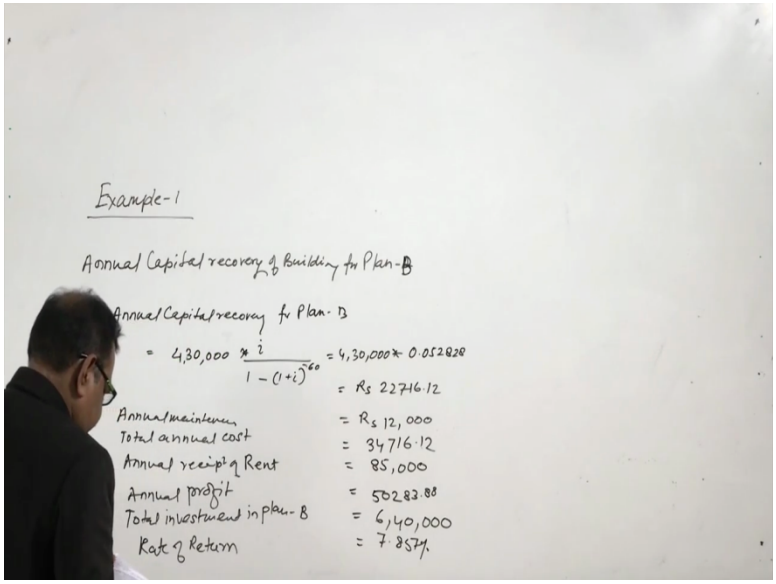

Example-1

Annual Capital recovery of Building for Plan-C

Annual Capital Recovery for Plan-C

$= 590000 \times \frac{i}{1-(1+i)^{-60}} = 5,90,000 \times 0.052 \approx 2818$

: 31168.63

Annual maintenance.	= 14,000
Total annual cost	= 45168.63
Annual receipt of Rent	= 1,50,000
Annual profit	= 57831.32
Total investment in plan-C	= 8,00,000
Rate of Return	= 6.854 %

Example-1

Incremental Rate of Return.

	Plan A	Plan B	Plan-C
Annual profit	34151.5	50288.88	57831.32
Total investment	5,10,000	6,40,000	8,00,000
Rate of Return.	6.67%	7.852 %	6.854 %
		1,30,000	1,60,000
Extra investment above next lower investment		16132.33	4547.49
extra income comparison to next lower		12.41 %	(2.842 %) less than 5%

n-term of extra investment

Example-1

Incremental Rate of Return.

	Plan A	Plan B	Plan-C
Annual P	151.5	50288.88	(57831.32)
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Rate of R	67%	7.852 %	6.854 %
		1,30,000	1,60,000
Extra abo in		16132.33	4547.49
		12.41 %	(2.842 %) less than 5%

50288.88 + 0.05 × 1,60,000

= Rs 58288.88

Now if you calculate it for plan B annual capital recovery for plan B is equal to 4,30,000 into i divided by 1 - 1 + i to the power - 60, this comes out to be 4,30,000 into 0.052828, this comes out to be rupees 22716.12, annual maintenance is rupees 12,000. So total annual cost for plan this + this is equal to 34716.12, annual receipt of rent is equal to 85,000, annual profit this - this comes out to be 50283.88, total investment in plan B is equal to 6,40,000 this is given as data in the table.

So rate of return comes out to be 7.857 percent, this is nothing but this divided by this into 100. Similarly, we can calculate for plan C. Plan C,now annual capital recovery for plan C is equal to 590000 into i divided by 1 - 1 + i - 60, this is 5,90,000 into 0.05282818 comes out to be 31168.63, annual maintenance is equal to 14,000 total annual cost is equal to this + this comes out to be 45168.63. Now annual receipt of rent is equal to 1,00,000, so annual profit is equal to this - this, is equal 54,831.37, total investment in plan C is equal to 8,00,000 this is the data which is given in the table, so rate of return is equal to 6.854 percent.

Now if you see the results of plan A, plan B and plan C, all the plans are offering a return greater than 5 percent and my minimum acceptable rate of return was 5 percent and hence all the plans are acceptable. As far as they are crossing they are (bi) they are crossing the minimum rate of return or they are giving more return than they minimum rate of return, but if I do the incremental rate of return analysis, the picture becomes more clear. Now if I go for the incremental rate of return, then this is plan A, plan B, plan C, annual profit 34151.5 this is 50283.88, this is 54831.37, total investment is 5,10,000, 6,40,000 and 8,00,000.

Rate of return 6.696 percent, 7.857 percent and 6.854 percent. Now if you see the extra investment above the next lower investment, so you find this is the lowest investment. Now if I deduct this from this so the extra investment here is 1,30,000, if I deduct this from this, this becomes. Now extra income in comparison to next lower is 16132.33, 4547.49, now this - this is this, this - this is this. Now if I find out the return on extra investment, I find here 12.41 percent and this is 2.842 percent, how this is calculated? This is a extra income 16132.33 this divided by this into hundred becomes this.

Similarly, this divided by this is this, so what is my conclusion? Now we will observe that this percentage is less than 5 percent which is my minimum return which I require. So what we see that, as incremental rate of return, the incremental rate of returns was maximum return for plan B, this is the maximum return for plan B I am getting and hence it should be

selected. So my selection will be plan B in this case, the extra money amounting to 1,60,000 I will not go for plan C.

Now the I have the extra money with me which is amounting to 1,60,000 if available should be invested in such a place like bank which will give the MARR equal to or more than 5 percent rather than investing in plan C. So the extra money is available I will not go for plan C because if that extra money will fetch me only 2.842 percent profit, whereas if I put that extra money into the bank, at least I will get 5 percent or more than 5 percent which is MARR. So based on this, my selection will be the B, so if I put that extra money into the bank and so I suppose I get only 5 percent interest, than my profit will be 50283.88 + 0.05 into 1,60,000 which comes out to be rupees 58283.88 which is more than this.

So this will be logical to put this 1,60,000 rupees into some bank and at least earn 5 percent and if I do so my profit will be maximized, in this case I get this profit 58,283, but if I put it into the plan C I get only 54,831.37. Let us summarize today's lecture, we have seen how to use the incremental rate of return method, though the problem which we have taken there we find that all the plans are okay as far as minimum rate of return is concerned because all were giving more than 5 percent. But when we go for the incremental rate of return, then out of three one plan which was giving incremental rate of return more than 5 and in this case plan B which was giving 12.41 came out to be the winner.

So, where rate of return may confuse in many cases when we do the incremental rate of return, it clearly comes out that which plan is a better plan to invest, thank you.