7. Investment Projects. Criteria for Capital Budgeting. Special Issues

Problem 43

The Myears Paint Company currently manufactures paint with a machine that cost $100,000 five years ago and that is being depreciated (straight line) to a salvage value of $0 five years from today. The raw materials for a gallon of paint cost $12,00, and the sales price is $20,00 per gallon. Myears Paint Company sells 25,000 gallons per year. Moni Levinska, new manager, estimates that Myears Paint Company can sell 20% more paint if she replaces the current machine with the new one that produces a higher-quality paint at the same cost. The new machine will cost $150,000 and be depreciated (straight line) to a value of $0 five years from today. Marginal tax rate is 40%.

(a) What is annual operating cashflow from operations with the current machine ?

(b) What will annual operating cash flow from operations be with the new machine ?

(c) Find the incremental change in the annual cash flow from operations if the old machine is replaced.

Solution

	(a)	(b)	(c)
Sales	500 000	600 000	100 000
Materials	300 000	360 000	60 000
Depreciation	10 000	30 000	20 000
EBIT	190 000	210 000	20 000
Income Tax	76 000	84 000	8 000
Net Income	114 000	126 000	12 000
Depreciation	10 000	30 000	20 000
CFAT	124 000	156 000	32 000

Problem 44

The Myears Paint Company is thinking of replacing an old machine that produces paint. The existing machine cost $100,000 three years ago and is being depreciated (straight line) to a salvage value of $0 seven years from now. It can be sold today for $60,000. The new machine will cost $150,000 and be depreciated (straight line) to a value of $0 five years from now. The cost of training employees to use the new machine will be $10,000, and installation costs for the new machine will be $6,000. Finally, the new machine will require an increase in working capital of $20,000. Tax rate is 25%.
(a) Find the book value of the old machine.
(b) Find the net initial outlay associated with replacing the old machine.

Solution

Depreciation old	10 000
BV of old machine	70 000

Direct CF

Purchase price	-150 000
Installation	-6 000
Training costs	-7 500
Total direct CF	-163 500

Depreciable Base	-156 000

Indirect CF

MV of old machine	60 000
Tax Savings	2 500
Net working capital	-20 000
Total Indirect CF	42 500

MV of old machine	60 000
BV of old machine	-70 000
Loss	-10 000

Total Initiat CFAT -121 000

Problem 45

Susan Fish is thinking of importing lobsters to sell to restaurants and specialty stores. She estimates that this venture will require an initial outlay of $200,000 to buy a refrigerated storage unit that can be depreciated (straight line) to a salvage value of $20,000 in eight years. In addition, she estimates that she will need $25,000 in working capital during the eight years of the project. Annual sales are estimated to be $100,000 and annual expenses, $50,000. Marginal tax rate is 20%.

(a) What is initial outlay associated with opening up the importing business ?
(b) What is the annual cash flow from operations ?
(c) What will be the terminal cash flow in year 8 ?
(d) What is the payback period for this project ?
(e) What is the accounting rate of return of this project ?
(f) If she requires a 15% to make this investment
what is the project's net present value ? What is the profitablility index ?
(g) What is the project internal rate of return ?

Solution

(a) **Initial cash flows**

Investment costs	-225,000

(b) **Operating cash flows**

Sales	100,000
Expenses	-50,000
Depreciation	-22,500
EBIT	27,500
Tax	5,500
Net income	22,000
Depreciation	22,500
CFAT	44,500

(c) **Terminal cash flows**

Salvage value	20,000
Recovery of NWC	25,000
	45,000

Sensitivity analysis

Δ prices	NPV	IRR
	-10,604	13,7%
-30,0%	-118,299	-1,4%
-20,0%	-82,401	4,0%
-10,0%	-46,502	9,0%
0,0%	-10,604	13,7%
10,0%	25,295	18,1%
20,0%	61,194	22,5%
30,0%	97,092	26,7%

(d) Payback period = Investment costs / ΔCFAT 5,056 =225/52.5

(e) AROR=net income/(investment costs +final value)/2 16,30%

(f)

0	1	2	3	4	5	6	7	8
-225,000	44,500	44,500	44,500	44,500	44,500	44,500	44,500	89,500

NPV = -10,604 Excel function NPV(12%, c48:k48)(1+12%)

PI= 0,95 (Investment costs + NPV) / Investment costs

(g) IRR= 13,66%

Problem 46

The X-Power Coal Company is considering a strip-mining project that requires a $120,000 initial outlay and will generate cash inflows from operations of $50,000 at the end of each of the next ten years. At the end of the tenth year, a $300,000 expenditure will be necessary to restore the land environmentally.

(a) Find the net present value of the strip-mining project if the discount rate is 0%, 5%, 10%, 15%, 20%, 25%, 30%, and 35%.

(b) What can be said about the uniqueness of the IRR of this project?

(c) Would you accept this project if the required rate of return was 5%? 20%? 40%?

Solution

0	1	2	3	4	5	6	7	8
-120,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	-250,000

Excel function =NPV(rate;$B$20:$L$20)*(1+rate)

rate	NPV
0%	-20,000
5%	0,109
10%	6,794
15%	6,296
20%	2,088
25%	-3,886
30%	-10,542
35%	-17,284

(b) The IRR is not unique. There is one IRR between 0% and 5% and one IRR between 20% and 25%.

4,96% Excel function =IRR($B$20:$L$20)

21,86% Excel function =IRR($B$20:$L$20;0,3)

(c) At 5% yes. At 20% yes. At 40% no.

Problem 47

You have to choose between two alternative investment plans.
Plan A requires an initial outlay of $100,000 and will generate annual cash flows of $20,000 during its 9-year life. At that time, its salvage value will be $18,000. Plan B requires the initial outlay of $120,000 but will generate annual cash flows of $25,000 during its 9-year life. Its salvage value at the end of year 9 is estimated to be $0,000. Your firm uses a 12% WACC to value either project.
(a) Find the NPV of project A.
(b) Find the IRR of project A to the nearest tenth of a percent (using Excel).
(c) Find the NPV of project B.
(d) Find the IRR of project B to the nearest tenth of a percent (using Excel).
(e) Which project should you choose, and why?

Solution

Project A

0	1	2	3	4	5	6	7	8	9
-100,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	38,0

(a) NPV= 13,056 Excel function =NPV(12%;$B$30:$N$30)*(1+12%)
(b) IRR= 15,15% Excel function =IRR($B$30:$N$30)

Project B

0	1	2	3	4	5	6	7	8	9
-120,0	25,0	25,0	25,0	25,0	25,0	25,0	25,0	25,0	25,0

(c) NPV= 13,206
(d) IRR= 14,83%

(e) Project A-B

0	1	2	3	4	5	6	7	8	9
20,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	13,000

IRR= 12,31%

Rate	NPV(A-B)	
10%	-1,002	
12%	0,000	
14%	0,945	

NPV(A-B) equals zero at the IRR, which is equal to 12,31%. Since NPV(A-B) increases as the discount rate increases, project B should be chosen for any discount

Problem 48

Piwnice Win S.A. purchased some French wine at a total expense of $100 000. The wine will become more valuable as it ages, with the following anticipated future values.

Year	Value	Year	Value
1	110 000	7	270 000
2	120 000	8	310 000
3	140 000	9	345 000
4	160 000	10	390 000
5	190 000	11	420 000
6	230 000	12	470 000

The required rate of return is 12%.

Calculate NPV for each of investment projects.

When should a company sell the wine if NPV criterion is used?

When should a company sell the wine if UAS criterion is used?

Solution

There are 12 mutually exlusive investment projects with different lives.

Net present value is calculated using formula:

$$NPV = -Z_o + \frac{S_t}{(1+i)^t}$$

where

Z_0 - purchase value in time t=0,

S_t - sales value in time t.

Net Present Value is the sum of discounted future payments (PMT):

$$NPV = \frac{PMT}{(1+i)^1} + \frac{PMT}{(1+i)^2} + ... + \frac{PMT}{(1+i)^n} = PMT * \frac{(1+i)^n - 1}{i*(1+i)^n}$$

So PMT is equal to:

$$PMT = PV \frac{i(1+i)^n}{(1+i)^n - 1} = PV \frac{i}{1-(1+i)^{-n}}$$

Year	NPV	PMT	Year	NPV	PMT
1	-1 786	-2 000	7	22 134	4 850
2	-4 337	-2 566	8	25 204	5 074
3	-351	-146	9	24 410	4 581
4	1 683	554	10	25 570	4 525
5	7 811	2 167	11	20 740	3 493
6	16 525	4 019	12	20 637	3 332

A company should sell the wine at the end of year 8.