Daffodil Institute of Information Technology (DIIT)

Third Year, Sixth Semester

BBA (Honors) in Tourism and Hospitality Management (THM)

Fundamentals of Finance

Chapter-5

INTRODUCTION TO CAPITAL BUDGETING (Math)

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1. An Engineering company is considering an investment proposal to install new equipment facility. The project will cost $ 1,00,000. The facility has a life expected of 5 years and no salvage value. The company's tax rate is 40%. The firm uses straight line method of depreciation. The estimated gross cash inflow from the proposed investment proposal are as follows:

Year	Cash flow
1	20,000
2	30,000
3	28,000
4	30,000
5	40,000

You are required to compute the followings:-

(i) Average rate of return.

(ii) Net present values at 10% discount rate.

(iii) Internal rate of return.

(iv) Profitability index at 10% discount rate.

Workings-1: Calculation of Net cash Benefit

Table: Calculation of Net Cash Benefit

Year	Gross Cash	Depreciation	CFBT	Tax@40%	EAT/NA	NCB
(1)	(2)	(3)	4=(2-3)	5=(4×40%)	6=(4-5)	7=(3+6)
1	20000	20000	0	0	0	20000
2	30000	20000	10000	4000	6000	26000
3	28000	20000	8000	3200	4800	24800
4	30000	20000	10000	4000	6000	26000
5	40000	20000	20000	8000	12000	32000
Total					**=28800**	

Workings-2: Calculation of annual depreciation

$$\text{Depreciation} = \frac{Cost\ of\ the\ equipment - Salvage\ value}{Expected\ life\ of\ Mschine}$$

$$= \frac{100000-0}{5}$$

$$= 20000$$

Requirement-2: Calculation of Average rate of return (ARR)

$$\text{Average rate of return (ARR)} = \frac{\text{Average Net Earnings}}{\text{Average Investment}} \times 100$$

$$= \frac{28800 \div 5}{100000 \div 2} \times 100$$

$$= \frac{5760}{50000} \times 100$$

$$= .1152 \times 100$$

$$= 11.52\% \text{Ans.}$$

$$\text{Average Investment} = \text{Working Capital} + \frac{\text{Investment+Salvage value / Scrap Value/Residual value}}{2}$$

Requirement-2: Calculation of Net Present Value (NPV)

$$\text{Net Present Value (NPV)} = \left[\frac{NCB_1}{(1+i)^1} + \frac{NCB_2}{(1+i)^2} + \cdots + \frac{NCB_n}{(1+i)^n}\right] - NCO$$

$$= \left[\frac{20000}{(1+.10)^1} + \frac{26000}{(1+.10)^2} + \frac{24800}{(1+.10)^3} + \frac{26000}{(1+.10)^4} + \frac{32000}{(1+.10)^5} - 100000\right.$$

$$= 95929.86086 - 100000$$

$$= -4070.13914$$

$$= -4070 \text{ Ans.}$$

Requirement-3: Calculation of Internal rate of return (IRR)

$$\textbf{Internal rate of return (IRR)} = Lr + \frac{NPV_{Lr}}{NPV_{Lr} - (-NPV_{Hr})} \times (Hr\text{-}Lr)$$

$$= 0.08 + \frac{1386}{1386-(-4047)} \times (.10\text{-}.08)$$

$$= .08 + \frac{1386}{5456} \times .02$$

$$= .08 + .254032 \times .02$$

$$=.08+.005080$$

$$=0.085080\times 100$$

$$= 8.50806$$

$$= 8.51\% \text{ Ans.}$$

Workings-3

Let, Interest rate= 8%

$$\text{Net Present Value (NPV)} = \left[\frac{\text{NCB}_1}{(1+i)^1} + \frac{\text{NCB}_2}{(1+i)^2} + \cdots\cdots + \frac{\text{NCB}_n}{(1+i)^n}\right] - \text{NCO}$$

$$= \left[\frac{20000}{(1+.08)^1} + \frac{26000}{(1+.08)^2} + \frac{24800}{(1+.08)^3} + \frac{26000}{(1+.08)^4} + \frac{32000}{(1+.08)^5} - 100000\right.$$

$$=101385.8059 - 100000$$

$$= 1385.8059$$

$$= 1386 \text{ Ans.}$$

Requirement-4: Calculation of Profitability Index (PI)

$$\text{Profitability Index (PI)} = \frac{\text{Present value of all cash inflows}}{\text{Present value of all cash outflows}}$$

$$= \frac{95929.86086}{100000}$$

$$= .95929\times 100$$

$$= 95.93\% \text{ Ans.}$$

2. LAMSTEC BD. is considering investing in either of two mutually exclusive projects X and Y. the firm has 14% cost of capital and the risk-free rate is currently 9%. The initial investment, expected cash flows and certainty equivalent factors associated with each of the projects are shown in the following table:-

Initial Investment	**Project X Tk. 40,000**		**Project Y Tk. 56,000**	
Year	**Cash inflows (Taka)**	**Certainty equivalent factors**	**Cash inflows (Taka)**	**Certainty equivalent factors**
1	20,000	.90	20,000	.95
2	16,000	.80	25,000	.90
3	12,000	.60	15,000	.85
4	10,000	.50	20,000	.80
5	10,000	.40	10,000	.80

Requirement: You are required to calculate the certainty equivalent net present value for each project. Which is preferred using this risk-adjusted technique?

Project-X

Calculation of Certainty Equivalent Net Present Value:

$$CENPV=\left[\frac{CE_1 \times CF_1}{(1+i)^1}+\frac{CE_2 \times CF_2}{(1+i)^2}+ - - - - - + \frac{CE_n \times CF_n}{(1+i)^n}\right] - NCO\ C$$

$$= \left[\frac{.90 \times 20000}{(1+)^1}+\frac{.80 \times}{(1+i)^2}+ - - - - - + \frac{CE_n \times CF_n}{(1+i)^n}\right] - NCO\ C$$

Where,

CF= Cash Flows
CE= Certainty Equivalent
NCO= Net Cash Outflow
I= Interest Rate