

# MODULE 3



## **INVESTMENT DECISION**

# OUTLINES

- The time value of money
- Nature of investment decision
- Procedures for investment decision
- Types of capital investment project
- Financing options for capital budget
- Capital budgeting
- Capital investment evaluation techniques

# The Time Value of Money

Time value of money is the concept that the value of a naira to be received in future is less than the value of a naira on hand today. One reason is that money received today can be invested thus generating more money. Another reason is that when a person opts to receive a sum of money in future rather than today, he is effectively lending the money and there are risks involved in lending such as default risk and inflation. Default risk arises when the borrower does not pay the money back to the lender. Inflation is the rise in general level of prices.

Time value of money principle also applies when comparing the worth of money to be received in future and the worth of money to be received in further future. In other words, Time Value of Money principle says that the value of given sum of money to be received on a particular date is more than same sum of money to be received on a later date.

Few of the basic terms used in time value of money calculations are:

- Present Value
- Future Value
- Interest

# Nature of investment decision

Investment decisions require special attention because of the following reasons:

**Growth:** The effects of investment decisions extend into the future and have to be endured for a longer period than the consequences of the current operating expenditure. A firm's decision to invest in long-term assets has a decisive influence on the rate and direction of its growth. A wrong decision can prove disastrous for the continued survival of the firm; unwanted or unprofitable expansion of assets will result in heavy operating costs to the firm. On the other hand, inadequate investment in assets would make it difficult for the firm to compete successfully and maintain its market share.

**Risk:** A long-term commitment of funds may also change the risk complexity of the firm, if the adoption of an investment increases average gain but causes frequent fluctuations in its earnings, the firm will become more risky. Thus, investment decisions shape the basic character of a firm.

## Nature of investment decision... cont.

**Funding:** Investment decisions generally involve large amount of funds, which make it imperative for the firm to plan its investment programmers very carefully and make an advance arrangement for procuring finances internally or extremely.

**Irreversibility:** Most investment decisions are irreversible. It is difficult to find a market for such capital items once they have been acquired. The firm will incur heavy losses if such assets are scrapped.

**Complexity:** Investment decisions are among the firm's most difficult decisions. They are an assessment of future events, which are difficult to predict. It is really a complex problem to correctly estimate the future cash flows of an investment economic, political, social and technological forces cause the uncertainty in cash flow estimation.

# Procedures for investment decision

- 1. Identification of investment opportunities:** Identification of investment proposals is the most critical aspect of the investment process and should be guided by the overall strategic considerations of a firm.
- 2. Developing cash flow estimation:** Estimation of cash flows is a difficult task because the future is uncertain, therefore, the risk associated with cash flows should be handled properly and taken into account in the decision process as the estimation of cash flows requires collection and analysis of all quantitative and qualitative data.
- 3. Evaluation of the net benefits:** In selecting a method of investment evaluation, a company should take adequate care to ensure that the criteria selected would lead, to the net increase in the company's wealth, that is, its benefit exceeds its cost adjusted for time value and risk.
- 4. Authorization to spend:** When large sums of capital expenditure is involved in approving investment proposal, the authority for the final approval may rest with the Board or the top management of the company.
- 5. Control and monitoring of capital projects:** A capital project reporting system is required to review and monitor the performance of investment projects during and after completion.

# Types of capital investment project

There are many ways to classify investment. One classification is as follows:

- 1. Expansion and diversification:** A company may add capacity to its existing product lines to expand existing operations. For example, a fertilizer company may increase its plant capacity to manufacture more kinds of fertilizer. It is an example of related diversification.
- 2. Expansion of new business:** Expansion of a new business requires investment in new products and a new kind of production activity within the firm. If a packaging manufacturing company invests in a new plant and machinery to produce ball bearing, which the firm has not manufactured before, this represents expansion of new business or unrelated diversification.
- 3. Replacement and modernization:** The main adjective of modernization and replacement is to improve operating efficiency and reduce costs, cost savings will reflect in the increased profits, but the firm's revenues may remain unchanged. Assets become outdated and obsolete with technological changes. The firm must decide to replace those assets with new assets that operate more economically. If a cement company changes from semi-automatic drying equipment to fully automatic drying equipment, it is an example of modernization and replacement.

# Financing options for capital budget

The common methods/options of financing capital projects include:

1. Buy or borrow
2. Lease
3. Hire purchase
4. Sales and lease back



# Capital Budgeting

Capital budgeting is a long-term budgeting or planning tool. It covers more than one accounting period. This is used by an accountant in making decisions as to investing capital on long-term projects. For example, long terms plan as to the extension of factory facilities or building a new factory. This tool is invariably meant for top management because of the scale and the long term nature of the investment on the profitability or otherwise of the project.

Numerous investments appraisal are available to assist with investment decisions but however sophisticated they may be, they have common characteristics that they compare the returns expected with the investment required.

The capital budgeting process includes:

- Replacement investment
- Investment for expansion
- Investment for product improvement
- New ventures.

# Capital investment evaluation techniques

There are two broad methods of investment appraisal which are:

- Non-discounting Methods
- Discounting Methods

**Non-discounting method:** is also known as the traditional method. It does not consider inflation and the other situation. It includes:

- Payback Period
- Accounting Rate of Return

**Discounting method:** is a method that consider inflation and other situations like tax etc. it includes:

- Net Present Value
- Internal Rate of Return

In this method, cash flows that are to be used are discounted at a given cost of capital.

## Capital investment evaluation techniques... contd

### ILLUSTRATIONS

#### **Question 1**

Mr. Century recently convinced his friends and relations to grant him a loan of N200,000 which he intends to invest in a farming project. He estimates that the project will yield the following returns annually for the next five consecutive years.

<b>Years</b>	<b>N</b>
1	60,000
2	60,000
3	50,000
4	60,000
5	40,000

There was no scrap value at the end of the fifth year and the company desires to evaluate the project on the basis of accounting rate of return and payback period.

#### **Required:**

Calculate the ARR and PBP

## Capital investment evaluation techniques... contd

### Solution

Accounting Rate of Return (ARR) = Average annual profits ÷ average Initial Investment  
Average Capital = Initial investment ÷ 2 = N200,000 ÷ 2 = N100,000  
Average Annual Profits = (60,000+60,000+50,000+60,000+40,000) ÷ 5 = N54,000

: ARR = ~~N~~54,000 ÷ ~~N~~100,000 × 100 = 54%

Payback Period (PBP)

<u>Year</u>	<u>Cashflows (₦)</u>	<u>Cumulative cashflows (₦)</u>
0	(200,000)	(200,000)
1	60,000	(140,000)
2	60,000	(80,000)
3	50,000	(30,000)
4	60,000	(30,000)
5	40,000	

Payback Period = 3years + (30,000 ÷ 60,000) × 12months

= 3years + 6months = **3years 6months**

## Capital investment evaluation techniques... contd

### Question 2

A company is considering which of the two mutually exclusive projects it should undertake. The finance director thinks that the project with higher NPV should be chosen whereas the managing director thinks that the one with higher IRR should be undertaken especially as both projects have the same initial outlay and length of life. The company anticipates a cost of capital of 10% and the net after tax cash flows of the projects are as follows:

Year	Project X (N'000)	Project Y N'000)
0	-200	-200
1	35	218
2	80	10
3	90	10
4	75	4
5	20	3

You are required to:

A] Calculate the NPV and IRR of each project

B] Recommend, with reasons, which project you would undertake (if either).

## Capital investment evaluation techniques... contd

### Solution

A]

Discount Factors	Project X		Project Y			
	10%	20%	NPV @ 10% (N'000)	NPV @ 20% (N'000)	NPV @ 10% (N'000)	NPV @ 20% (N'000)
Year0	1.000	1.000	(200.00)	(200.00)	(200.00)	(200.00)
1	0.9091	0.833	31.82	29.16	198.19	181.66
2	0.8264	0.6944	66.11	55.55	8.26	6.94
3	0.7513	0.5787	67.62	52.08	7.51	5.79
4	0.683	0.4823	51.22	36.17	2.72	1.93
5	0.6209	0.4019	<u>12.42</u>	<u>8.04</u>	<u>1.87</u>	<u>1.21</u>
			<u>29.19</u>	<u>19.00</u>	<u>18.56</u>	<u>(2.47)</u>

Using the interpolation method, the IRRs are:

$$\text{Project X} = 10\% + [29.19 / (29.19 + 19.00)] \times 10\% = 16.05\%$$

$$\text{Project Y} = 10\% + [18.56 / (18.56 + 2.47)] \times 10\% = 18.83\%$$

## Capital investment evaluation techniques... contd

B]

The projects are mutually exclusive, and conflicting rankings occur. Where conflicting rankings occur, the NPV method will indicate the correct rankings.

The NPV calculations assume that funds generated by the project, are invested at the firm's cost of capital. IRR assumes reinvestment at the calculated IRR which could be realistic if the IRR is significantly higher than the firm's cost of capital.

Therefore, Project X should be undertaken since it yields the larger NPV at a discount rate of 10%.

## Capital investment evaluation techniques... contd

### Question 3

The Santox Company operates in Urbantia where investments in plant and machinery are eligible for 25% annual capital allowances on the written-down value using the reducing balance method of depreciation. The corporate tax rate is 35%. The company is considering whether to purchase some machinery which will cost N1million and which is expected to result in additional net cash inflows and profits of N500,000 per annum for four years. It is anticipated that the machinery will be sold at the end of year 4 for its written-down value for taxation purposes. Assume a one year lag in the payment of taxes. Calculate the net present value assuming a cost of capital of 10%.



## Capital investment evaluation techniques... contd

### Solution

Year	Cash flow (N)	Taxation (N)	Net Cash flow	DF (10)	PV (N)
0	(1,000,000)	0	(1,000,000)	1.000	(1,000,000)
1	500,000	0	500,000	0.9091	454,550
2	500,000	(87,500)	412,500	0.8264	348,090
3	500,000	(109,370)	390,630	0.7513	293,480
4	500,000	(125,780)	690,620	0.6830	471,690
	316,400				
5	0	(138,090)	(138,090)	0.6209	<u>(85,740)</u>
					NPV = <u>482,070</u>

### Workings

End of Year	Annual Capital Allowance (N)	Written-down Value (N)
0	0	0
1	250,000 (25% × N1,000,000)	1,000,000
2	187,500 (25% × N750,000)	750,000
3	140,630 (25% × N562,000)	421,870
4	<u>105,470 (25% × N421,870)</u>	316,400
	<u>683,600</u>	

## Capital investment evaluation techniques... contd

*Workings ...contd*

### Additional taxable Profits arising from the project (Taxation to be Paid)

	<b>Year 1(N)</b>	<b>Year 2(N)</b>	<b>Year 3(N)</b>	<b>Year 4 (N)</b>
Incremental annual profits	500,000	500,000	500,000	500,000
Less annual capital allowance	<u>250,000</u>	<u>187,500</u>	<u>140,630</u>	<u>105,470</u>
Incremental taxable profits	<u>250,000</u>	<u>312,500</u>	<u>359,370</u>	<u>394,530</u>
Incremental tax at 35%	87,500	109,370	125,780	138,090

## Capital investment evaluation techniques... contd

### Question 4

Suppose a firm forecasts the following project cash flows in real terms and discount at a 15% nominal rate. Should the firm invest in it if 10% rate of inflation is assumed?

	<b>Y<sub>0</sub></b>	<b>Y<sub>1</sub></b>	<b>Y<sub>2</sub></b>	<b>Y<sub>3</sub></b>
	<b>₦</b>	<b>₦</b>	<b>₦</b>	<b>₦</b>
Project cash flows	(100,000)	35,000	50,000	30,000

### Solution

It would be inconsistent to discount the real cash flows at 15% nominal rate. The question can be solved by converting real cash flows to nominal cash flows and discounting at 15% nominal rate, to obtain the real rate of return.

## Capital investment evaluation techniques... contd

Converting real cash flows to nominal terms.

Yrs	Real Cash Flows		Nominal Cash Flows
	₦	₦	₦
0	(100,000)	100,000 (1.00)	= (100,000)
1	35,000	35,000 (1+0.1)	= 38,500
2	50,000	50,000 (1+0.1) <sup>2</sup>	= 60,500
3	30,000	30,000 (1+0.1) <sup>3</sup>	= 39,930

$$\begin{aligned} \text{NPV} &= \frac{(100,000)}{1} + \frac{(38,500)}{1.15} + \frac{(60,500)}{(1.15)^2} + \frac{(39,930)}{(1.15)^3} \\ &= (100,000) + 33,478 + 45,747 + 26,255 \\ &= \mathbf{5,480} \end{aligned}$$

# Review Questions

1)

Your client has been presented with two alternative investment project propositions requiring a 12% return on capital. The solar project will cost ₦35million and the cost of the thermal project is ₦31million with expected income flows for five years as follows:

## Cash flows

Year	Solar Project (₦'000)	Thermal Project (₦'000)
1	7,500	6,000
2	8,000	7,500
3	10,200	9,000
4	11,500	10,500
5	12,000	12,000

A] What is the payback period of each of the projects?

B] Which project will you recommend based on present value method?

C] Given trial rates of 10 and 14 percents on the projects, which project will you recommend based on internal rate of return?

# Review Questions

2)

The following data are supplied relating to two investment projects, only one of which may be selected:

		<b>Project A</b>	<b>Project B</b>
		<b>₦</b>	<b>₦</b>
Initial capital expenditure		<b>50,000</b>	<b>50,000</b>
Profit (loss) year	1	25,000	10,000
	2	20,000	10,000
	3	15,000	14,000
	4	10,000	26,000
Estimated resale value at end of year 4		10,000	10,000

## **Notes:**

- i. Profit is calculated after deducting straight-line depreciation.
- ii. The cost of capital is 10%

## **Required:**

Calculate for each project:

- i) Average ARR on average capital invested. (ii) PBP. (iii) NPV

# Review Questions

3) A project has a cash outlay of ₦200,000. The company estimated that the net cash inflows will be as follows:

Year:	1	2	3	4
Cash flows:	20,000	40,000	220,000	80,000

Calculate the PBP for the project.

4) Company C is planning to undertake a project requiring initial investment of ₦50 million and is expected to generate ₦10 million in Year 1, ₦13 million in Year 2, ₦16 million in year 3, ₦19 million in Year 4 and ₦22 million in Year 5. Calculate the payback value of the project.

5) Hassan received a loan of ₦200,000 which he intends to invest in a farming project. Below are the annual estimated yields of the project for the next 5 years:

Year:	1	2	3	4	5
₦'000	60	60	80	60	40

There was no scrap value at the end of the fifth year and the company desires to evaluate the project using ARR.

Provide the ARR of this project on the assumption that the returns are profits after depreciation.

# Review Questions

6) Mayokun Ltd has a capital budget of 500,000 for the year to 30<sup>th</sup> June 2009. The available projects have been identified and quantified by the Technical Director and Works Manager as listed below. The individual project's related profitability index has been computed by a financial management team and stated hereunder:

<b>Projects</b>	<b>Initial Outlay (₦)</b>	<b>Profitability Index</b>
A	250,000	1.10
B	100,000	0.95
C	200,000	1.25
D	200,000	1.23
E	250,000	1.05
F	100,000	1.20
G	50,000	0.99

## **Required:**

- Which projects should the company invest in?
- What difference would the absence of capital rationing make to your selection in (a) above?



# References

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