

THOMAS ADEWUMI UNIVERSITY

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INVESTMENT APPRAISAL

Definition of Investment

An investment is an asset that is acquired with the purpose of allowing its value to increase over time. Investment refers to the allocation of resources, typically money, with the expectation of generating future income or profit. It is an asset acquired with the goal of generating income from it. It is the commitment of money resources at various times in the hope of future economic rewards.

Types of Investment

Stocks: They are units of equity in a company. A share of stock is a piece of ownership of a public or private company.

Bonds: They are debts that companies and government draw from various stakeholders with a fixed maturity and interest rate.

Real Estate: These investments are often broadly defined as investments in physical, tangible spaces that can be utilized. Real estate investments may include acquiring sites, developing sites for specific uses or purchasing ready – to – occupy sites.

Commodities: These are physical products that can be invested in. The types of commodities are metals such as gold and silver, agricultural produce, livestock, energy like crude oil, petroleum products and natural gas.

Definition of Investment Appraisal

Investment appraisal is a means of assessing whether an investment or project is worthwhile or not. Investment appraisal, also known as capital budgeting, is the process of evaluating and selecting investment projects or proposals based on their potential for generating returns and creating value for the organization. It involves analyzing the financial viability, risks, and benefits of various investment opportunities to determine which ones align best with the company's strategic objectives and financial goals.

The investment appraisal process typically involves several steps:

1. **Identification of Investment Opportunities:** This involves identifying potential projects or opportunities that require investment, such as purchasing new equipment, launching a new product line, expanding operations, or acquiring another company.
2. **Estimation of Cash Flows:** Once investment opportunities are identified; the next step is to estimate the expected cash inflows and outflows associated with each project over its entire lifespan. This involves forecasting revenues, expenses, and capital expenditures.
3. **Evaluation of Investment Criteria:** Various investment criteria or techniques are used to evaluate the financial viability and attractiveness of investment projects.
4. **Consideration of Non-financial Factors:** In addition to financial metrics, investment appraisal may also consider qualitative factors such as strategic fit, market demand, technological feasibility, regulatory compliance, and environmental impact.
5. **Risk Assessment:** Assessing and quantifying the risks associated with each investment project is crucial. Factors such as market risks, operational risks, competitive risks, and project-specific risks need to be evaluated to understand their potential impact on the project's outcomes.
6. **Decision Making and Selection:** Based on the results of the investment appraisal, management selects and prioritizes the most promising investment projects that align with the company's objectives and constraints.

Types of investment appraisal methods:

Investment appraisal encompasses various methods and techniques used to evaluate the financial viability and attractiveness of investment projects. There are two major methods of investment appraisal which are further divided into five methods. The two major methods are traditional methods and discounted cash flow methods.

A. Traditional methods:

1. Payback Period,
2. Accounting Rate of Return (ARR)

B. Discounted cashflow methods:

1. Internal Rate of Return (IRR),
2. Profitability Index,
3. Net Present Value

Payback Period

Payback period is defined as the period, usually expressed in years, which it takes for the projects net cash inflows to recoup the original investment. It refers to the amount of time it will take for the complete amount invested to be recovered through net cash flow. In other words, it indicates how long it will take for the project to "pay back" its initial investment.

Merits and Demerits of Payback Period

Merits

- a. Simple to calculate
- b. Easy to understand
- c. It does not recognize depreciation as an expense
- d. It favours projects that have quick return potentials

Demerits

- a. It completely ignores any other cash inflow once the payback period has been arrived at.
- b. It ignores the timing of cash inflows.

To calculate the payback period:

Formula:

$$\text{Payback period:} = \frac{\text{initial investment outlay}}{\text{Net cash flow per period or annual cash inflow}}$$

This formula can be used when the cash inflows are equal.

Initial investment outlay: this is the initial outlay or cost that the business incurs when it begins an investment or project. It usually involves design, survey, and consultant expenses, as well as working capital costs like stock maintenance and contingency reserves.

Annual Cash Inflows: these refer to the estimated annual earnings or returns that the business expects to make from the particular investment.

Example:

1. Suppose a business is considering investing in a new product line which will have an initial cost of #500,000 and it is expected to generate returns of #100,000. The payback period will be as thus,

Solution:

Initial investment outlay
annual cash inflow

$$\frac{\#500,000}{\#100,000} = 5 \text{ years} \quad (\text{that is if the annual cash inflow is the same})$$

When the annual cash inflows are not equal;

To know the exact period, the formula is:

$$PB = E + B/C$$

Where

PB = Payback period

E = Number of years immediately preceding year of final recovery

B = Balance amount still to be recovered

C = Cash flow during the final year of recovery.

Example: A company invested in a business with an initial outlay of #5,000,000 and the following are the predicted net cash inflows over the next five years;

Year 1: 1,185,000 Year 2: 1,125,000 Year 3: 1,140,000 Year 4: 1,770,000 Year 5: 1,180,000.

Question: How long will it take project recoup the investment?

Solution:

Years	Cash flows (#)	Cumulative Cashflow
0	(5,000,000)	-5,000,000
1	1,185,000	-3,815,000
2	1,125,000	-2,690,000
3	1,140,000	-1,550,000
4	1,770,000	220,000
5	1,180,000	1,400,000

The payback period is approximately four years. Apply the formula will give the exact period the investment will be recouped

$$\begin{aligned} \text{PB} &= 3 + \frac{1,550,000}{1,770,000} \\ &= 3 + 0.8 = 3.8 \text{ years.} \end{aligned}$$

Accounting Rate of Return

This is defined as the ratio of average annual profits after depreciation to capital invested. The method also takes the average accounting profit that the investment will generate and expresses it as a percentage of the average investment in the project as measured in accounting terms.

The ARR is also called the average rate of return. It's important to note that ARR is based on accounting profits rather than cash flows and does not consider the time value of money.

Decision Rule: To decide whether the return is acceptable, the percentage must be compared with the minimum required by the business. If the firm has a target ARR that is less than the percentage achieved, then this investment is acceptable, otherwise not.

To calculate the ARR:

1. Determine the average annual accounting profit generated by the investment project. This is usually calculated by taking the average of the net income or accounting profit over the project's lifespan.
2. Determine the average investment, which is usually calculated by averaging the initial investment cost over the project's lifespan.
3. Input the values into the formula to calculate the ARR.

The formula:

$$\frac{\text{Average annual return or annual profit} \times 100}{\text{Average Investment}}$$

$$\text{Average annual profits} = \frac{\text{total profits}}{\text{number of years}}$$

$$\text{Average investment} = \frac{(\text{Initial investment} + \text{Salvage value})}{2}$$

Note: where the cashflow is given instead of net profit: Cashflow - depreciation (-taxes, interest) = Net profit. Also, where the salvage value is not given, add zero to initial investment. Depreciation is calculated as: Initial investment - salvage value (salvage value means the remaining useful life of the asset).

Example:

A company is considering a project with a required investment of #600,000. The expected useful life of the project is 6 years (straight line depreciation) with a salvage value of #150,000. The company wants 30% rate of return. The expected net profits are as follows:

Year 1: #60,000, Year 2: #90,000, Year 3: #110,000, Year 4: #150,000, Year 5: #110,000, Year 6: #90,000

Solution:

$$\text{ARR} = \frac{\text{Average annual profits}}{\text{average investment}} \times 100$$

The first thing to get here is the average profits.

$$\text{Average profits} = \frac{60,000 + 90,000 + 110,000 + 150,000 + 110,000 + 90,000}{6} = \frac{610,000}{6} = \#101,667.66$$

Then the average investment:

$$\frac{600,000 + 150,000}{2} = \frac{750,000}{2} = \#375,000$$

$$\text{ARR} = \frac{101,667.66}{375,000} \times 100 \quad \text{ARR} = 27.11\%$$

The project should be rejected because the calculated rate of return, 27.11% is lower to company's expectation of 30% rate of return

Discounted Cash Flow Methods

Discounted cash flow (DCF) methods are a set of valuation techniques used to estimate the value of an investment or business by discounting its expected future cash flows to present value. These methods consider the magnitude and timing of cashflows in each period of a project's life.

The methods are:

1. Net Present Value
2. Internal Rate of Return
3. Profitability Index

Net Present Value

Net Present Value: This is the difference between the present value of cash inflows and the present value of cash outflows for a project. It is a method of calculating the present value of cash flows (inflows and outflows) of an investment proposal using the cost of capital as an appropriate discounting rate. It considers time value of money.

Formula;

$$PV = FV \frac{1}{(1 + r)^n}$$

Where; FV = is the amount to be received in the future or future value;

N = Number of years,

r = Annual interest rate

A positive NPV indicates that the investment is expected to generate value, while a negative NPV indicates that it is not economically viable.

Decision Rule: Accept the project if the NPV is positive

Reject if the NPV is negative

NPV: Example;

Calculate NPV of the two projects and suggest which of the two projects should be accepted, assuming discount rate at 10%. The initial investment for project X is #40,000 and for project Y is #60,000. The estimated life for each project is 5 years respectively.

Cash Inflows for each project:

Years	Project X (#)	Project Y (#)
1	10,000	40,000
2	20,000	20,000
3	20,000	10,000
4	6,000	6,000
5	4,000	4,000

Solution: For Project X

Years	Cash Flows	Discounting Factor	Present Value
0	(40,000)	1	(40,000)
1	10,000	0.909	9,090
2	20,000	0.826	16,520
3	20,000	0.751	15,020
4.	6,000	0.683	4,098
5.	4,000	0.621	2,484
			NPV = 7,212

For Project Y

Years	Cash Flows	Discounted Factor	Present Value
0	(60,000)	1	(60,000)
1	40,000	0.909	36,360
2	20,000	0.826	16,520
3	10,000	0.751	7,510
4.	6,000	0.683	4,098
5.	4,000	0.621	2,484
			NPV = 6,972

Decision Rule: The company should select project Y because it has higher NPV than project X.

Internal Rate of Return (IRR)

The internal rate of return is the rate at which NPV is zero; the rate, at which the present value of the cash inflows is equal to those of the outflows, and the break-even rate. Alternative names for the IRR include DCF yield, marginal efficiency of capital, trial and error method, discounted yield and the actuarial rate of return.

Decision Rule:

Under the IRR, the investment criteria are as follows:

Invest if $IRR > \text{cost of capital}$. That is invest if the internal rate of return is more than the cost of capital.

Do not invest if the $IRR < \text{cost of capital}$. That is, do not invest if the internal rate of return is less than the cost of capital.

Example

Femi Nig. Ltd is proposing to purchase a new machine for N20, 000,000 which will have a life span of 6 years. The cash inflows estimated to be generated by the machine are as follows: Year 1 = N12,400,000; Year 2 = N6,000,000; Year 3 = N7,100,000; Year 4 = N2,203,000 and Year 5 = N2,774,000 and removed in year 6 an estimated net cash outflow of N1,477,000.

Assuming the IRR is between 20% and 22%

Let's try 20%

Years	Cash Flow (#)	DCF @ 20%	Net Present
0	(20,000)	1.000	(20,000)
1	12,400	0.833	10,329
2	6,000	0.694	4,164
3	7,100	0.579	4,111
4	2,203	0.402	1,061
5	2,774	0.402	1,061
6.	(1,477)	0.335	(495)

Total: 285

Solution Cont'd

Let's try 22%

Years	Cash Flow (#)	DCF @ 22%	Net Present
0	(20,000)	1.000	(20,000)
1	12,400	0.820	10,168
2	6,000	0.672	4,032
3	7,100	0.551	3,912
4	2,203	0.451	994
5	2,774	0.370	1,026
6.	(1,477)	0.303	(447)

Total: -315

Since IRR lies between positive and negative numbers, it should lie between +286 and -315. Hence, using the formula to calculate the IRR, we have:

$$\text{IRR} = x + (a/a+b) (y-x)$$

Where:

X = the lower rate of interest used Y = the higher rate of interest used

a = the absolute NPV at X% b = the absolute NPV at Y%

Solution:

$$20\% + (285/285 + 315) \times (22-20)$$

$$= 20 + (285 \times 2)/600$$

$$= 20 + 0.95$$

$$= 20.95\%$$

Profitability Index

It is the ratio between the present value of future cash flows and the initial investment.

It measures the present value of future cash flows generated by an investment per unit of initial investment. The PI indicates the amount of value created by each unit of currency invested.

It can be calculated using the following formula:

$$\text{PI} = \frac{\text{Total PV of net cash flows}}{\text{Initial investment}}$$

Decision Rule:

Accept only projects that have profitability index of more than 1 (one)

Reject projects that have profitability index of less than one

Example

Ade Manufacturing Company is to invest on two projects. The initial investment for the projects are #80,000 and #90,000 respectively. The cost of capital is 10% for the projects. While the yearly cash flow expected from the projects are:

For project A: #30,000; #35,000; #20,000; #40,000. For project B: #45,000; #25,000; #30,000; #40,000

Solution:

The first step is to calculate the present value of the cash flow using the given discount factor which is 10%.

The formula: $1/(1 + r)^n$

e.g: year 1: $1/(1+0.10) * 30,000 = 0.909 * 30,000$

year 2: $= 0.826 * 35,000$

year 3: $= 0.751 * 20,000$

year 4: $= 0.683 * 40,000$

Now, to calculate the profitability index:

PI = $\frac{\text{Total PV of net cash flows}}{\text{Initial Investments}}$

Example

Project A			Project B	
Years	Cash Flow (#)	Present Value	Cash Flow (#)	Present Value
1	30,000	27,273	45,000	40,905
2	35,000	28,910	25,000	20,650
3	20,000	15,020	30,000	22,530
4	40,000	27,320	40,000	27,320
Present value of future cash flows		98,523		111,405

For project A:
 $98,523 / 80,000 = 1.231$

For project B:
 $111,405 / 90,000 = 1.237$

Which project should be selected?

Select the project with a higher profitability index. This means for every naira invested in this project, it gives a return of 1.237.

THE IMPACT OF INFLATION ON INVESTMENT

Inflation can be simply defined as an increase in the average price of goods and services. The accepted measure of general inflation in Nigeria is the Retail Price Index (RPI) which is based on the assumed expenditure patterns of an average family. General inflation is a factor in investment appraisal but of more direct concern is what may be termed specific inflation i.e. the changes in prices of the various factors which make up the project being investigated, e.g. wage rates, sales.

Here are some key ways inflation influences investment cash flows:

- 1. Income Erosion:** Inflation erodes the purchasing power of investment income, such as interest payments from bonds or dividends from stocks. If the rate of return on investments does not keep pace with inflation, investors may experience a decrease in real (inflation-adjusted) returns. For example, if inflation rises faster than the interest rate on a bond, the real value of the bond's interest payments decreases over time.
- 2. Capital Appreciation:** Inflation can affect the value of assets held within an investment portfolio. Some investments, such as real estate or stocks, may benefit from inflation as the value of the underlying assets increases over time. However, not all investments respond positively to inflation, and the impact varies depending on factors like industry dynamics and economic conditions.

3. Cost of Borrowing: Inflation can influence borrowing costs, which can impact cash flow for leveraged investments. If inflation leads to higher interest rates, the cost of servicing debt increases, reducing the net cash flow available to investors. This is particularly relevant for businesses or individuals who use debt financing to fund investments.

4. Operating Expenses: Inflation can drive up operating expenses for businesses, affecting their profitability and cash flow. Higher costs for materials, labor, and other inputs can squeeze profit margins, reducing cash flow available for investment or distribution to investors.

5. Tax Implications: Inflation can also affect the tax treatment of investment income and capital gains. In some cases, nominal gains may exceed real gains due to inflation, resulting in higher tax liabilities for investors. Tax laws and regulations related to investments may also be adjusted in response to inflationary pressures, impacting after-tax cash flows.

NPV with Inflation

When considering inflation in net present value (NPV) calculations, it's essential to adjust cash flows for the effects of inflation to maintain their present value in real terms. Here's how you can incorporate inflation into NPV calculations:

1. **Nominal Cash Flows:** Start with estimating nominal cash flows for each period of the investment project. These are the actual cash inflows and outflows expected over the project's lifespan without adjusting for inflation.
2. **Inflation Rate:** Determine the expected inflation rate over the investment period. This rate represents the annual increase in the general price level of goods and services.
3. **Real Cash Flows:** Convert the nominal cash flows into real cash flows by adjusting them for inflation.

The formula for adjusting cash flows for inflation is:

$$\text{Real Cash Flow} = \frac{\text{Nominal Cash Flow}}{(1+\text{Inflation Rate})^n}$$

Where:

- Nominal Cash Flow is the cash flow for a particular period.
- Inflation Rate is the annual inflation rate (expressed as a decimal).
- n is the number of periods into the future.

4. **Discount Rate:** Determine the appropriate discount rate to calculate the present value of real cash flows. The discount rate should reflect the risk associated with the investment project and the opportunity cost of capital.

5. **NPV Calculation:** Use the discounted real cash flows to calculate the NPV of the investment project. The formula for NPV is:

$$NPV = \sum \frac{\text{Real Cash Flow}_t}{(1+\text{Discount Rate})^t} - \text{Initial Investment}$$

Where:

Real Cash Flow t is the real cash flow for period t .

Discount Rate is the discount rate (expressed as a decimal).

t is the time period.

Initial Investment is the initial investment outlay required for the project.

Incorporating inflation into NPV calculations allows for the assessment of the investment's true profitability and compare it with alternative investment opportunities in real terms. It's essential to use realistic estimates for inflation, discount rates, and cash flow projections to make informed investment decisions.

Cash Flow with Inflation

There may be cash flows in 'real terms', known as real cash flows. That's the amount that would spend if a product was to be bought today. Let's say the cost of a product in one year's time is £110, and inflation is 10%, that means that the product in 'real terms' costs £100. The actual amount that would be actually paid in one year is £110, and this is known as the nominal cash flow. It's this cash flow that must be included in most NPV calculations.

To inculcate the effect of inflation on NPV, use real interest rate for real cash flows and nominal interest rate for nominal cash flows. There is no inflation effect on real cash flows while there is inflation effect on nominal cash flow.

Cost of Capital with Inflation

Another issue can be the use of real and nominal cost of capital figures. If real cash will be used (no inflation), then calculating real costs of capital we will also be (no inflation).

If we're using nominal cash flows (with inflation) for our NPV, however, we will also need to use nominal costs of capital (with inflation).

To calculate the nominal cost of capital we use the Fisher Equation (named after American economist Irving Fisher) to calculate a nominal cost of capital:

Formula:

$$(1 + \text{real cost of capital}) \times (1 + \text{general inflation rate}) = (1 + \text{nominal cost of capital})$$

Or in algebraic form... $(1 + r) \times (1 + i) = (1 + n)$

Where:

r = Real cost of capital

i = General inflation rate

n = Nominal cost of capital

Example:

Adegun limited company is considering a project which would cost #5,000 now. The annual benefits, for 4 years, would be a fixed income of #2,500, plus savings of #500 a year in year 1, rising by 5% each year because of inflation. Running costs would be #1,000 in the first year, but would increase at 10% each year because of inflating labour costs. The company's required rate of return is 16%. Is the project worthwhile?

Solution

Year	Initial cost	Fixed Income	Other savings	Running Costs	Net Cash Flow	DCF@16%	PV (NCF * DCF)
0	(5000)				(5000)		(5000)
1		2500	500	(1000)	2,000	0.862	1724
2		2500	525	(1100)	1652	0.743	1431
3		2500	551.25	(1210)	1842.25	0.640	1180
4		2500	578.81	(1331)	1747.81	0.552	965

NPV = #303

FEASIBILITY REPORT

A feasibility study involves the process through which the viability of a business can be assessed. Since it involves a process, steps are taken to analyze the workability and profitability of a proposed business venture.

The analysis takes into consideration the following areas of business operations:

1. Financial Requirement
2. Production Requirement
3. Personnel Requirement
4. Demand and Supply of Product/services
5. Financial Projections.

Components of Feasibility Studies

1. Market Feasibility:

- Analysis of target market demographics, size, trends, and demand.
- Assessment of competitors, market saturation, and entry barriers.
- Identification of potential customers and market segments.
- Estimation of sales projections and revenue potential.

2. Technical Feasibility:

- Evaluation of technological requirements and capabilities.
- Assessment of infrastructure, equipment, and resources needed.
- Analysis of technical constraints, risks, and challenges.
- Identification of technical solutions and alternatives.

3. Financial Feasibility:

- Estimation of initial investment costs and capital requirements.
- Projection of revenue streams, expenses, and cash flows.
- Calculation of financial metrics such as Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period.
- Sensitivity analysis to assess the impact of key variables on financial outcomes.

4. Operational Feasibility:

- Evaluation of operational processes, workflows, and systems.
- Assessment of organizational capabilities and human resources.
- Identification of operational risks, constraints, and dependencies.
- Development of an implementation plan and timeline.

Process of Conducting Feasibility Studies:

1. **Define the Scope:** Clearly outline the objectives, scope, and parameters of the feasibility study. Define what you want to get data
2. **Gather Data:** Collect relevant information, data, and resources required for analysis.
3. **Conduct Analysis:**
 - **Market Analysis:** Research market dynamics, customer needs, and industry trends.
 - **Technical Analysis:** Assess technical requirements, limitations, and solutions.
 - **Financial Analysis:** Calculate costs, revenues, and financial metrics.
 - **Operational Analysis:** Evaluate operational processes, capabilities, and risks.
4. **Evaluate Alternatives:** Consider different scenarios, options, and alternatives to determine the most feasible approach.
5. **Make Recommendations:** Based on the findings of the feasibility study, recommend whether to proceed with the project, modify it, or abandon it.
6. **Prepare Feasibility Report:** Document the findings, analysis, conclusions, and recommendations in a comprehensive feasibility report.

Feasibility Reports

A feasibility report is a report that evaluates a set of proposed project paths or solutions to determine if they are viable. A feasibility report is a comprehensive analysis of the practicality and viability of a proposed project, idea, or business venture. It assesses various factors such as economic, technical, operational, legal, and scheduling aspects to determine whether the proposed project is achievable and worth pursuing. The purpose of a feasibility report is to provide decision-makers with the necessary information to make informed choices about whether to proceed with the project or not.

Feasibility reports typically include:

1. **Executive Summary:** A brief overview of the key findings and recommendations of the report.
2. **Introduction:** An introduction to the proposed project and its objectives.
3. **Description of the Project:** A detailed description of the project, including its scope, goals, and intended outcomes.
4. **Market Analysis:** An assessment of the market demand, competition, and potential customers for the proposed product or service.

5. **Technical Feasibility:** An evaluation of the technical requirements and capabilities needed to implement the project.
6. **Financial Feasibility:** An analysis of the financial aspects of the project, including cost estimates, revenue projections, and potential return on investment.
7. **Operational Feasibility:** An assessment of how the proposed project will integrate with existing systems, processes, and resources.
8. **Legal and Regulatory Considerations:** An examination of any legal or regulatory issues that may affect the implementation of the project.
9. **Risk Analysis:** An identification and evaluation of potential risks and uncertainties associated with the project.
10. **Recommendations:** Conclusions and recommendations based on the findings of the feasibility study, including whether to proceed with the project and any suggested modifications or alternatives.

BUSINESS PLAN

Business plan is a formal planning process in starting a new business venture and it is essential towards establishing a viable and profitable entity. Hence business plan focuses on the entire venture and is to describe all the elements involved in starting a new business venture.

A business plan incorporates the following areas in business operations:

1. **The Industry**

This is the overview of the industry in which the business will operate such as industry trends, industry turnover and likely market share of the business in the industry.

2. **Market Analysis**

This is the target market of the business, geographical location, and demographic of the target market, their needs and plans to meet them.

3. **Competition in the Industry**

This involves the number of competitors, their competitive advantages and the venture's strategies in meeting such challenges.

4. **Marketing Strategies**

This refers to a comprehensive analysis of the venture's sales strategies, pricing policies, promotion strategies, and peculiar advantages of the venture's products/services.

5. **Financial Plan**

This has to do with detailing of financing requirements, source of financing the ventures, owner's contribution, and financial projections.

6. **Management Plan**

This is a comprehensive plan on management resources of the venture; management team, external resources or outsourced personnel, emoluments and welfare packages for motivation.

7. **Operating Plan**

This describes the physical location of the business, strength of employees needed for the venture, facilities and equipment, inventory requirements and suppliers, production method, and manufacturing process.



THE END.....