Capital Investment Decisions

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Introduction

Decision on long term investments is quite pivotal due to many reasons. It is a part of the duties of entity’s key management to effect most accurate decision with respect to the long term investments.

How the decision determines as long term investment? Key features;

- Involvement of **large amount of resources.** (asset or revenue base)
- Involvement of **risk & uncertainty.** (more about future)
- **Long period** of time. (generally 05 years or more than 05 years)
- Require relatively **large amount of cash at the beginning** and return recognize over a long period of time.
- **Difficult to reverse without loss** of substantial funds.
- Developed based on the **available data.** (Financial & non-financial)
The Process Involved in Decision Making

An entity tends to make investment decisions with due care since involvement of high level of risk and uncertainty. Hence, it attempts to follow established decision-support procedures. Key determinants in the assessments of investment (decisions) would be relative risk and return.

Generally, following key steps involved in making investment decisions.

1. Identify all the investment alternatives available at a given time. (ME & NME)
2. Select a relevant decision-support tool and set the decision rule.
3. Collect necessary data/information to make the decision.
4. Analyze the data/information.
5. Interpret the results in line with decision rules.
6. Make the decision.

Once all the above steps followed, next immediate task is to arrange finance and begins planning process. Physical implementation of the investment/project will be at next.

Investment alternatives

- New Investments (↑Revenue)
- New Technology (↓Cost)
- Replacement of assets (↑Asset base)
Following key techniques are widely used in investment decision making.

**Technique**
- NPV
- Discounted CFs
- IRR
- PP
- Non-Discounted CFs
- ARR
- PP

**ARR - Accounting Rate of Return**
ARR measures the average profitability of the project as against average initial investment made.

\[
ARR = \frac{\text{Average Profit}}{\text{Average Investment}}
\]

*Average profit (eliminating depreciation) for the project period.
**Value of the invested equipment at the beginning and end of project period. (average)
When decision takes through ARR, opportunity cost also need to be consider.
**Decision Rule (in general)**

| ARR > RRR | accept |
| ARR = RRR | accept / reject |
| ARR < RRR | reject |

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Simple to calculate</td>
<td>- Ignores the time value of money</td>
</tr>
<tr>
<td>- Easy to understand</td>
<td>- Ignores the importance of cash</td>
</tr>
<tr>
<td>- Easy to take decision since in line with return on assets.</td>
<td>- Profit &amp; costs measures in different manner.</td>
</tr>
</tbody>
</table>
**PP - Payback Period**

Payback period is the period of time necessary to recoup the initial outlay/outflow (investment) with the net cash inflows. Hence, the expected net cash inflows in each year are added until the sum is equal or greater than the initial outlay/outflow.

**Decision Rule**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP &lt; PPP</td>
<td>select</td>
</tr>
<tr>
<td>PP = PPP</td>
<td>select / reject</td>
</tr>
<tr>
<td>PP &gt; PPP</td>
<td>reject</td>
</tr>
</tbody>
</table>

**Advantages**
- Simple to calculate
- Easy to understand
- Provide crude measure and easy to take decisions.

**Disadvantages**
- Ignores the time value of money
- Ignores cash received after payback period.
NPV - Net Present Value

NPV is the Most common technique used in making an investment decision which considers the net of cash inflows and outflows after discounting at proper rate over the project period.

Dis. cash outflows → (xxxx)

xxxx ← Dis. cash inflows

NPV xx / (xx)

Formulae:

\[ PV = \frac{FV}{(1+i)^n} \]

PV = Present Value

FV = Future Value

1 = Constant

i/r = interest / discount rate

* . FV = PV (1+i)^n

n = Period of the project

\[ PV = \frac{cf_1}{(1+r)} + \frac{cf_2}{(1+r)^2} + \ldots + \frac{cf_n}{(1+r)^n} \]

\[ NPV = \frac{cf_1}{(1+r)} + \frac{cf_2}{(1+r)^2} + \ldots + \frac{cf_n}{(1+r)^n} - INV \]

Decision Rule

NPV > 0 → accept (Positive)
NPV = 0 → accept / reject
NPV < 0 → reject (Negative)
Most of the time, entities used discount table when determining the rate (rate at which project being financed) for discount the project.

Factors to be consider when determining proper discount rate.

- Key macro economic factors.
- Risk involved with the investment/project.
- Opportunity costs.

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<td>- Consider all of the expected cash flows</td>
<td>- Depend on the discount rate used</td>
</tr>
<tr>
<td>- Consider timing of expected cash flows</td>
<td>- Not compare with the initial investment</td>
</tr>
<tr>
<td>- Consider cash flows only. Hence no affect from concepts &amp; accounting standards</td>
<td>- Cannot use for ranking the projects</td>
</tr>
</tbody>
</table>
**IRR - Internal Rate of Return**

IRR is the rate of return that discounts the cash flows of a project so that the PV of the cash inflows just equals the PV of the cash outflows.

The rate at which:

\[
0 = (-\text{Inv}) + \frac{\text{cf}_1}{(1+r)^1} + \frac{\text{cf}_2}{(1+r)^2} + \cdots + \frac{\text{cf}_n}{(1+r)^n}
\]

**Decision Rule**

- **IRR > RRR** → accept
- **IRR = RRR** → accept/reject
- **IRR < RRR** → reject
### Advantages
- Consider all the cash flows
- Consider time value of money
- In line with the concept of rate of return

### Disadvantages
- Ignores the scale of the project
- Some cases, produces two IRR values
- Some cases, conflicts with NPV when ranking projects

**Discussion**: how non-conventional cash flows affect the decision.

**NPV Vs IRR**

![NPV vs IRR graph]

Positive NPV - accept (NPV decreases as $r$ increases)

Negative NPV - reject ($r$ is so large that NPV is negative)
Practical Issues in Making Decisions

- Collection of necessary data/information.
- Effects of corporate tax.
- Opportunity costs.
- Treatment of working capital.
- Risk. (including Sovereign Risk)
- Obtaining and using finance/funds.
- Human Resources.
- Goodwill & future opportunities.
- Social responsibility and care of the (natural) environment.
Investment Appraisal (advanced aspects)

- ME & NME projects
- If ME – is period equal – yes – highest NPV
- If ME – is period equal – No – highest annual equivalent
- Annual equivalent – NPV Vs. Cumulative DF (AEF)
- If NME – accept all which gives + NPV (if money available)
- If NME – all gives + NPVs – money is limited – Project rationing
- Project rationing – NPV Vs. money invested (highest PI)
- If projects could break – perfect in NME situation
- Adjustment for project risks – either to cash flows or to DF
- Adjust to DF – RADR or Adjust to cash flows – certainty equivalent (α)

ME – Mutually Exclusive
NME – Non Mutually Exclusive
PI – Profitability Index
DF – Discount Factor