

# Capital Budgeting in Local Government Bodies in India

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## ABSTRACT

Public infrastructure plays a prominent role in any economy. Among them, road construction and their maintenance is very crucial for the local government within their jurisdiction. A study says that nearly 30.98% is spent by the local government as capital expenditure. This study is to describe various techniques that the local government bodies use, for the implementation of capital budgeting. This study also describes the various packages that can be used for the calculation of techniques of the capital budgeting.

**KEYWORDS:** Capital Budgeting, NPV, IRR, Profitability Index, ARR, Discounted Cash flow, Discount rate, R Programming, Python, MS Excel

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## INTRODUCTION

Road transport is one of the most important infrastructures for any economy. It influences the pattern, structure and stride of development of an economy. The expenditure for the construction of a road is very huge, but the funds are needed to be managed more efficiently. For this, capital budgeting is very important for the proper management of financial resources in any local government body.

Capital budgeting is one of the most important aspects of financial management. Capital budgeting, also known as Investment appraisal is the process of optimal allocation of financial resources in order to gain a higher rate of return. It is a process of evaluating the capital invested and the expenditure made in order to gain the highest possible returns from the investment. It involves huge capital expenditures over a long period of time. These decisions refer to assets which are in operation and yield a return over a period of time, usually exceeding one year. It decides whether the capital invested by the organization in the long run is worth making or not. It evaluates the profitability of an investment made by any organization.

**Here, the question among major people is, how does the construction of roads generate revenue for the government?**

Firstly, roads indicate how civilized an economy is. The level of transportation is the one which creates more revenue for an economy. Governments have many policy instruments at their funding to encourage the development of transportation infrastructure. Roads generate much revenue by direct taxes like tolls, user fees (gas tax, airport facility taxes, etc.), Land-based Taxes like Property Taxes,

Assessments on adjacent property, Value Capture and the General Revenue Sources are Income taxes, Statute labour, or the corvee, working out the road tax (a form of Poll Tax), Fines for failure to perform statute labour, Sales taxes. There are also Voluntary Revenue Sources like Donations, Private subscriptions (stock and bond sales), Public lotteries and the other revenue sources are Public land sales, Military Funds, etc.

### 1. Stages of capital budgeting

There are four stages of capital budgeting for the project of any kind of organization. It is very important to make appropriate decisions for investing in the project.

#### Stage 1: Definition of the project and Estimating the cash flows

The first stage of capital budgeting in the case of government the definition of the project and Estimating the cash flows is the definition of the project and the estimation of cash flows. Here, we must make sure that these opportunities must suit the strategies and objectives of the organization. This is the most crucial part of the capital budgeting process. Capital investment is generally divided as initial cash flow and the operating cash flows, which are expected to generate over future years. So, it is very important to estimate the cash flows.

#### Stage 2: Project analysis and selection

The second stage is the project analysis and selection of the project. Here the organizations analyze and choose the projects for implementation where the expected benefits exceed the expected costs.

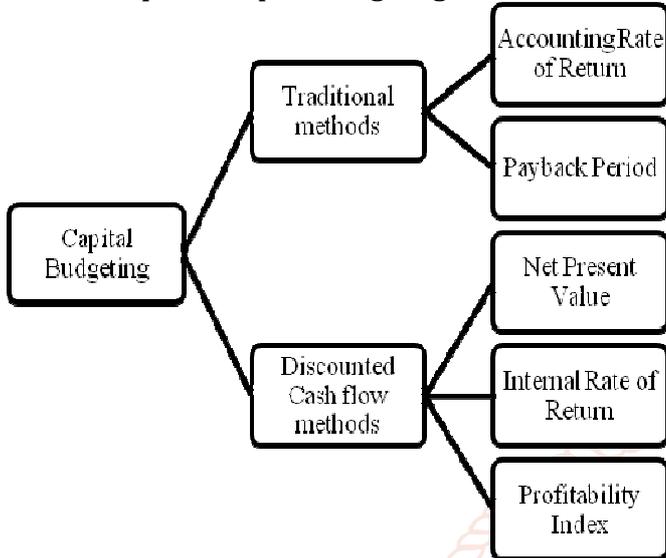
**Stage 3: Project Implementation**

Here, the projects are implemented. This implementation must have a timeline, i.e., this implementation must be completed in a specific period of time.

**Stage 4: Project review**

This is the stage where the status of the project is assessed, at a particular point of time.

**2. Techniques of Capital Budgeting**



**A. Traditional Methods of Capital Budgeting:**

**i. Accounting Rate of Return**

This may be defined as the percentage of return that is expected from an investment. It is the ratio of the average revenue to the average initial investment.

$$ARR = \frac{\text{Average revenue}}{\text{Average initial investment}}$$

**ii. Payback Period**

Payback period may be defined as the time period in which we can recover our investment made in a particular project.

$$\text{Payback period} = \frac{\text{Initial Investment}}{\text{Net Cash flow per period}}$$

**B. Discounted Cash Flow methods**

**i. Net Present Value**

It is the difference between the present value of the total of cash inflows and the present value of cash outflows over a period of time.

$$NPV = \sum_{t=1}^n \frac{R_t}{(1+i)^t}$$

where:

$R_t$ =Net cash inflow-outflows during a single period

$i$ =Discount rate

$t$ =Number of time periods

**Decision rule:**

- If NPV is less than zero, then we reject the project
- If NPV is greater than or equal to zero, then we accept the project

**ii. Internal Rate of return**

It is the interest rate at which the net present value of all the cash flows become zero.

**Decision rule:**

- We accept the project if IRR is **greater than or equal to** the cost of capital.
- We reject the project if IRR is less than the cost of capital.

**iii. Profitability Index**

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

$$PI = \frac{\text{Present value of future cash flows}}{\text{Initial Investment}}$$

$$PI = \frac{NPV + \text{Initial investment}}{\text{Initial Investment}}$$

With the uptrend of the usage of capital budgeting techniques, the local government bodies use the traditional payback period and discounted cash flow techniques of Internal Rate of Return (IRR) and Net Present Value (NPV).

**3. Capital Budgeting with the help of various packages**

With the increase of usage of Technology nowadays, there are many packages like R programming, Python, Excel and so on to use these techniques more accurately. Let us learn how to calculate the capital budgeting techniques in various packages.

**I. Capital Budgeting in MS-Excel:**

The traditional capital budgeting methods and the profitability index are calculated with the help of simple arithmetic expressions, whereas the discounted cash flow methods, there are some functions like npv(cell range), IRR(cell range).

Suppose the initial investment is s.2,00,000, discount rate is 10% and the cash flows for ten years is 35000 per year, then the npv can be calculated with the help for the following syntax:

```
=npv(10,-200000,35000,35000,35000,35000,35000,35000,35000,35000,35000)
```

The IRR can be calculated with the help of following syntax:

```
=irr(-200000,35000,35000,35000,35000,35000,35000,35000,35000,35000,35000)
```

**II. Capital Budgeting in R programming:**

To calculate the various methods of capital budgeting in R programming, we use a package called FinCal. This is very easy, accurate. We just need to enter the data, then use a simple syntax.

First, we must load the package 'Fincal' with the syntax: library (Fincal)

Then we must enter the discount rate, cash flows and use the syntax.

For NPV, we use npv (discount rate, cash flows)  
For IRR, we use irr (cash flows)

The following is the code for calculating various techniques of Capital Budgeting in R programming:

```

R version 3.6.0 (2019-04-26) -- "Planting of a Tree"
Copyright (C) 2019 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[workspace loaded from ~/.RData]

> library(FinCal)
> t=0.10
> initialinvestment=200000
> cashflows=c(35000,35000,35000,35000,35000, 35000,35000,35000,35000,35000)
> cf=c(-initialinvestment,cashflows)
> NetPresentValue=npv(t,cf)
> InternalRateofReturn=irr(cf)
> ProfitabilityIndex=((npv(t,cf)+initialinvestment)/initialinvestment)
> AccountingRateofReturn=(mean(cashflows)/initialinvestment)
> PaybackPeriod=(initialinvestment/mean(cashflows))
> print(NetPresentValue)
[1] 15059.85
> print(InternalRateofReturn)
[1] 0.1172796
> print(ProfitabilityIndex)
[1] 1.075299
> print(AccountingRateofReturn)
[1] 0.175
> print(PaybackPeriod)
[1] 5.714286
> |

```

### III. Capital Budgeting in Python:

We use the packages numpy and statistics packages in python to calculate the capital budgeting techniques. We use numpy package for calculating npv, IRR and profitability index and for ARR and payback period, we use statistics package.

The following is the code for calculating the capital budgeting techniques in Python.

```

Python 3.7.4 (tags/v3.7.4:e09359112e, Jul 8 2019, 19:29:22) [MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> import statistics
>>> import numpy as np
>>> initialinvestment=200000
>>> cashflows=[35000,35000,35000,35000,35000, 35000,35000,35000,35000,35000]
>>> t=0.10
>>> cf=[-200000,35000,35000,35000,35000,35000,35000,35000,35000,35000]
>>> NPV=np.npv(t,cf)
>>> IRR=np.irr(cf)
>>> PI=(initialinvestment+np.npv(t,cf))/initialinvestment
>>> ARR=statistics.mean(cashflows)/initialinvestment
>>> paybackperiod=initialinvestment/statistics.mean(cashflows)
>>> print("NetPresentValue=",NPV)
NetPresentValue= 15059.848699663817
>>> print("InternalRateofReturn=",IRR)
InternalRateofReturn= 0.11725483657177249
>>> print("ProfitabilityIndex=",PI)
ProfitabilityIndex= 1.075299243498319
>>> print("AccountingRateofReturn=",ARR)
AccountingRateofReturn= 0.175
>>> print("PaybackPeriod=",paybackperiod)
PaybackPeriod= 5.714285714285714
>>>

```

**Discount Rate:**

The most common term we see in all the above techniques is the discount rate. The discount rate is the rate at which we calculate the present value of future returns. The choice of the discount rate is of two types: 1) Financial discount rate 2) Social discount rate.

1. **Financial discount rate:** It represents the opportunity cost of capital. The financial discount rate is used in the process of evaluating the performance of an investment option. The possibilities for this are the Weighted Average Cost of Capital (WACC), Marginal Rate of Return on investment.
2. **Social discount rate:** It is the discount rate used for calculating the value of funds in social projects. The parameters which are used in the calculation of this social discount rate are:
  - a. Rate of growth of public expenditures(g)
  - b. Elasticity of demand(n)
  - c. Rate of time preference of money(p)

Now,  $SDR = ng + p$

**Findings and conclusions**

- The government uses only the tried and true techniques for the capital budgeting.
- Prudent analysis must be made for the investment decisions to minimize the failures in the project.
- The methods NPV, IRR and payback period are the best capital budgeting practices made by the public sector.
- A single discount rate should not be used for all the capacity building projects.
- The local government bodies should also make use of new packages like Python, R programming, and others for the accurate evaluation of the capital budgeting.

**References:**

- [1] [https://www.theglobaleconomy.com/India/Capital\\_investment/](https://www.theglobaleconomy.com/India/Capital_investment/)
- [2] <https://www.ukessays.com/essays/construction/construction-of-the-road-construction-essay.php>
- [3] [https://en.wikibooks.org/wiki/Transportation\\_Economics/Revenue#Revenue\\_Sources](https://en.wikibooks.org/wiki/Transportation_Economics/Revenue#Revenue_Sources)
- [4] [https://www.jstor.org/stable/40603727?read-now=1&seq=9#page\\_scan\\_tab\\_contents](https://www.jstor.org/stable/40603727?read-now=1&seq=9#page_scan_tab_contents)
- [5] <https://cran.r-project.org/web/packages/FinCal/index.html>
- [6] [http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=10&ved=2ahUKEwifooW7863nAhUimuYKHUEjDqcQFjAJegQIChAB&url=http%3A%2F%2Fonlinepubs.trb.org%2FOnlinepubs%2Fnlchrp%2Fnlchrp\\_syn\\_80.pdf&usq=AOvVaw2oJdhQrZ6XyRmol0n-y75r](http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=10&ved=2ahUKEwifooW7863nAhUimuYKHUEjDqcQFjAJegQIChAB&url=http%3A%2F%2Fonlinepubs.trb.org%2FOnlinepubs%2Fnlchrp%2Fnlchrp_syn_80.pdf&usq=AOvVaw2oJdhQrZ6XyRmol0n-y75r)
- [7] <http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwifooW7863nAhUimuYKHUEjDqcQFjAAegQIARAB&url=http%3A%2F%2Feresources.worldbank.org%2FINTRANSPORT%2FResources%2F336291-1119275973157%2Ftd-rd4.pdf&usq=AOvVaw0C0J9ZbxZmwcU3sm5mQ00w>
- [8] <https://fred.stlouisfed.org/data/INTDSRINM193N.txt>
- [9] Sivanathan Sivaruban(2018) "Capital Budgeting and Cost Evaluation Techniques A Conceptual Analysis"
- [10] Wendorf, Jill (2005) "Capital Budgeting from a Local Government Perspective," SPNA Review: Vol. 1: Iss. 1, Article 6.
- [11] Financial Management by Prasanna Chandra, Tata McGraw-Hill Education, 2007

