A Comparative Study on Concepts of Evaluating of Capital Investment

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DOI: 10.23918/ICABEP2019p21

Abstract

This research study is the aimed to optimize the capital budgeting applies in the investments or projects to understand efficiently to making maximize the profits in over the time benefits. To meet the research objectives that arrange the investment plan to take full advantage of the net present value, and the investors can utilize the capital of investments, and the capital evaluation criteria in the project's implementation can be optimizing the cost benefits this study used five capital evaluation elements NPV, EAC, PI, IRR and Payback Period. This study is the analytical concept to study mentioned the five financial evaluation criteria, to analyze scopes of financial budgets. In this research assumed examples based on the real projects or investments and separated each example principles have measured to be clear figure information. Furthermore, the working out of the technique is also based on the methods of modeling of business processes, business value, and capital budgeting. in the research outcome identify there is strong relationship between the net present value and equivalent annual cost that is has impact the maximize profits and internal rate return according to the payback period at this review if, NPV > 0, the venture is viewed as viable and the other way around when NPV < 0. The task is viewed as incapable from the monetary perspective and is rejected.

Keyword: Net Present Value, Earn Annual Cost, Profit Index, Internal Rate of Return and Payback Period.

Introduction

Capital budgeting is considered as essential financial management tool to estimate the project assets and enhancing the investments. (Lunkes, et al. 2014) Page 40-44. The techniques for net present value (NPV) and of internal rate of return (IRR) are among the ones most much of the time utilized in the assessment of speculation projects in view of marked down money streams. As indicated by examines by various creators, the techniques have a general character, compact methodological principle and wide application in the territories of the projects assessment in different type of investments. Capital investment understandably review funds based on the assumption that the objective of a firm's manager is to maximize firm value, that is, the wealth of its shareholders. Therefore, capital investment appraisal and cost of capital estimation are major decisions that the financial manager must make. In this process, it is crucial that management use accurate methods that will result in the maximization of shareholder wealth. In fact, managers should undertake capital investment projects only if they add to the value of the firm, which means that managers should identify and undertake all projects that add value to the company so as to maximize shareholder value. "Profitable capital investment leads to the growth and prosperity of an economy. If profitability is low, investment will shrink. The investor needs tools to predict the profitability of proposed investments". Over the last four decades, the academic community has been proposing several methods that can improve the capital investment decision making process of companies (Jonathan and Peter 2014). Capital budgeting examination the strategies or capital planning practices which are the tools for understanding the cost of the implementing the projects that have been characterized the techniques and systems used to assess and choose an assumption project. There is the use of the methods are various uses by the firms and organizations thus, the different type of the firms is using the different of the techniques which will be well documented and planed for the specific methods of the capital investment. Capital investment appraisal is about the target of an organization's executive manager is to expand firm esteem, that is, the wealth of its investors. Consequently, capital assumption evaluation and cost of capital estimation are real choices that the money related supervisor needs to make. In this procedure, it is crucial that administration utilize precise strategies that will result in the increase of investor wealth. Beneficial capital project prompts the development and flourishing of an economy. If productivity is low, investment will contract the opportunist needs for the firms and the

capital of investment methods are the tools to anticipate the gainfulness of proposed ventures (Afonso and Cunha 2009). Generally, Organization amid its life takes several projects and choices that related in interest in the long-run return. The long run benefit that can be buying the new machine, new building which is giving the productivity line and target the capital investment. these choices are critical on account of substantial measure of assets required, the length of the period, and hazard identified with these choices, so the utilizing of proper choice models is high level of significance which is can give benefit in the uses of the capital investment and helps the manager to meet the goal of the capital investment in the continuing selling the goods and rendering services in profit return (Haddidi 2016). In capital budgeting there are some categories of projects available to classify the investments. Independent Projects is the investments cash flows are not related to one another or it is not depending others the acceptance of one it is does not exclude the others from further consideration. Mutually exclusive projects are the investments or a project that compete with the others therefore, the acceptance of one removes from further consideration the other projects are serve parallel function. Unlimited Funds the firm's financial can accept many independent investments that provide a suitable return. Capital Rationing the firm's financial is limited that is fixed amount available for capital expenditures, and several projects are compete for this fixed amount. Accept-Reject Access the assessment of the capital expenditure it is determine whether they meet the firm's minimum acceptance principles. Ranking Approach, the ranking of capital expenditure projects based on some predetermined measure, such as the rate of return (Hana, Lenka and Fotr 2010) Page 49-50.

The IRR procedure is broadly connected in individual back to gauge both genuine and conjecture rate of profits on investment securities, land, MasterCard obligation, consumer loans, and rents. Long-term investment signifies to sizable costs of assets that submit a firm to some plan of action. Therefore, the firm needs techniques to dissect and select its Long-term investment. Capital planning is the assessing and choosing Long-term projects that are predictable with the association's objective of expanding the owner's wealth. Firms regularly make an assortment of long-term investment, the most widely recognized is in fixed assets, like resources, which incorporate property (Land), plant, and equipment. These assets, frequently alluded to as earning assets, regularly give the reason for the company's gaining power and value (Titaman, Keown and Martin 2014) Page 359.

Research objective:

How the investors can arrange the investment plan to maximize the net present value if the cash flow extent independent period of the time?

Where the investors can utilize the capital of investments?

Which criteria in the project's implementation can be optimizing the cost benefits?

Research problem:

In the study problem the investors should researching for the evaluating capital of investments depend on the five criteria of the evaluation investments in the financial methods to be better magnitudes concerning of the period that investments occur and rate of return over the time. According to the equivalent annual cost the investors conducting with the projects dependent on their net present value that is identify the estimate assets in the cash inflow and cash flow in out. In financial evaluation this five criteria NPV, EAC, PI, IRR and Pay Back Period, stakeholders must optimize the capital budgeting and it is become genuine calculation in the future return (Lunkes, et al. 2014).

Literature review

Capital Budgeting the way toward assessing and choosing the long-term investment that is unsurprising with the organization's objective of benefit from the proprietors' capital. Probably, nothing that budgetary chiefs do is increasingly basic to the long – term accomplishment of an association than settling on incredible venture choices. Capital planning is a troublesome procedure for the speculation of accessible assets. The advantage will accomplish just soon at the same time, what's to come is questionable. The general goal of capital planning is to amplify productivity. On

the off chance that a firm focus rate of profitability, this target can be accomplished either by expanding the incomes or lessening the expenses. The expanding incomes can be accomplished by extension or the extent of tasks by including another product offering. Decreasing costs mean speaking to out of date return on resources. (Paramasivan and Subramanian 2009) Page120-122. The term capital planning portrays the technique for assessing and choosing investment ventures. Normally, capital uses can be broad, for instance, collecting another plant or pushing another item advertising. These endeavors can make gigantic motivation for investors; anyway, they can moreover bankrupt the association. Around there, you will make sense of how cash related budgetary supervisors which venture opportunities to look for after. In your Personal life you can use the capital arranging strategies used by budgetary money related directors to check either the estimation of a given asset purchases or its compound rate of return. The natural estimation of the venture to the financial specialist will mirror its evaluation of the sum and timing of the speculation money streams and its impression of the related dangers. The financial specialist won't have any desire to pay more than this inherent esteem; it will likewise wish to limit the hazard that sudden future use will be required to keep up the estimation of the speculation. Most importantly, the speculator will need to guarantee its investors profit by the obtaining and that their profits are augmented. The obtaining of a greater part shareholding will regularly require instalment of a 'control premium well beyond the present market esteem per share for a minority holding in the objective, successfully expanding the abundance of the objective's moving investors to the detriment of the acquirer's investors (Agar 2005) Page 6.

Capital Expenditure that is the measure of costs that organizations assessed to spend getting the advantages over a specific period it's over one year. In spurring the capital of uses inside this year the organizations are accepting getting the results. Settled resources are the piece of capital uses, on another hand, all of the consumptions are not classified as the settled resources. For instance, if you have spent $40,000 to buy a new machine for 10 years serviceable that capital expenditure classified as a fixed asset on the organization’s balance sheet. Moreover, if the firm’s expense $30.000 for an advertisement to create the benefits for long period it is also reflected as capital expenditure it is the fixed assets (Titaman, Keown and Martin 2014) Page 358-382. It means the firms has many reasons to create capital expenditure. The basic motives for capital expenditures are to expand operations, to replace or renew fixed assets, or to obtain some other, less tangible benefit over a long period. Operating expenditure an expenditure of capitals by the firm resulting in benefits received within 1 year. Capital budgeting process five yet interrelated steps: proposition generation, audit and examination, choice making, usage, and development (Agar 2005)

The capital budgeting process (Titaman, Keown and Martin 2014) Proposal generation. Proposition for new investment ventures adventures are made by any stretch of the organizations' dimensions inside a business affiliation and are minded by the money workforce. Suggestions that require tremendous expenses are more purposely researched than less overrated ones.

Review and analysis. Financial managers are having the official evaluations to audit the assumptions proposition.

Decision Making. The typical firm represents to of consumption basic leadership they will make the premise of dollar limits. The governing body have rights to make consumption in certain sum. Occasionally, the chief of arranging settles on the specialist choices to keep line of generation moving.

Implementation. Following approval, consumptions are made and extend executed. Consumptions for a huge task frequently happen in stages.

Follow-up. Results are scrutinized, it is looked at the real expenses and advantages where it assigned. Making activities may be required if the outcomes are fluctuating from the project.

Each movement in the process is imperative. Survey and investigation and choice making (Steps 2 and 3) expend the greater part of time and effort, in any case. Development (Step 5) is an essential

however regularly overlooked advance went for permitting the firm to enhance the exactness of its cash flow estimates continuously.

The Typical Capital Budgeting Process

In the organizations distinguish the Evaluating the capital speculations and capital of ventures are accepting the income over an extensive stretch of times that takes a year, it is the capital planning process. In activities, for the most part, the pertinent money flows will be anything but difficult to distinguish. These will be the straight forward sums for the underlying expense, continuous receipts of money from deals, progressing money consumptions on creation expenses and individual resource end flows (Dayananda, et al. 2002) Page 14. Al choices that have taken is impact the future profit of the organizations. This procedure can be utilized to analyze different choices like purchasing another machine, extending activities at another geographic area, moving the home office or notwithstanding supplanting the old resource. These choices have the ability to affect the future achievement of the organization. This is the reason the capital planning process is a significant piece of any organization (Jonas and Vladislav 2010). For this case the; First: The firm's management categorizes capable investment opportunities. Second: The investment opportunity's value-creating potential (for shareholders) is thoroughly evaluated.

Unlimited Funds vs. Capital Rationing

The accessibility of benefits for capital uses impacts the organization's decisions. In case a firm has endless resources for theory (or if it can gather as much money as it needs by acquiring or issuing stock), settling on capital arranging decisions is exceptionally direct: All free endeavors that will give a palatable return can be recognized. Ordinarily, nonetheless, firms work under capital allotting. This suggests they have only a settled number of dollars open for capital utilizations, what's more, that different assignments will pursue these dollars (Titaman, Keown and Martin 2014).

Accept–Reject vs. Ranking Approaches

Two essential ways to deal with and manage capital arranging decisions. The acknowledge reject approach incorporates surveying capital utilization suggestion to choose if they meet the affiliation's base affirmation rule. This methodology can be used right when the firm has unfathomable resources, as a preliminary development while evaluating usually specific undertakings, or in a condition in which capital must be proportioned. In these cases, simply satisfactory undertakings should be considered. The second system, the situating procedure, incorporates situating assignments on the reason of some fated measure, for instance, the rate of return. The assignment with the most critical return is situated to begin with, and the errand with the least return is situated last. Simply commendable endeavors should be situated. Situating is significant in picking the "best" of a get-together of absolutely disconnected exercises and in evaluating adventures with a point of view of capital allocating (Titaman, Keown and Martin 2014).

Capital Budgeting Decision

Capital planning, besides investment evaluation, is the masterminding method used to make sense of if an organizations' long-haul speculation for instance, new apparatus, reestablishment from guaranteeing hardware, new plants, new items, likewise investigation enhancement adventures need help worth the advancing of cash through those organization's advancement structure. Capital planning choices majorly affect the estimation of the firm and its investor riches. This book manages capital planning choices (Dayananda, et al. 2002) Page 2-3. For this case if we assume a project as XYZ Company decision that decided to invest $12.5 million to build a land project in Erbil is an example of capital budgeting decision. It means the investors can know how this decision affecting to the project with certify that amount of the capital to start his project (Titaman, Keown and Martin 2014).

Types of Capital Investment Projects

The most profitable investments are highest preferable that is provide the life and growth to the company. There are several points compromising the most profitable projects (Titaman, Keown and Martin 2014) Page 358-382.

Revenue improving Investments,

Cost-reduction investments, and

Mandatory investments that are a consequence of government orders

In desirability of investment, there are a few investigative apparatuses can be utilized to decide the task recommendations rely upon the time of times, venture consumptions, productivity, the rate of return inside the association and diminishing the recompense time frame

Net Present Value (NPV),

Equivalent Annual Cost (EAC),

the Profitability Index (PI),

The Internal Rate of Return (IRR)

The discounted payback period (PP).

Research Methodology:

This research is the analytical concept to study five financial evaluation criteria is used NPV, EAC, PI, IRR and Payback Period, to analyze scopes of financial budgets. In this study assumed examples based on the real projects or investments and separated each example principles have measured to be clear figure information. Furthermore, the working out of the technique is also based on the methods of modeling of business processes, business value, and capital budgeting.

The measure of capital the funding firm has under administration is maybe a standout amongst the most essential contemplations. The size of the reserve drives the sort of venture portfolio and, explicitly, the quantity of investee organizations the funding firm ought to have. Capital likewise decides the assets accessible to deal with the funding firm. The expansion idea in account has straightforward ramifications for investors. On the off chance that the ideal expansion is accomplished by having around 20 resources or firms in the portfolio, investment firms planning to accomplish this impact ought not have more than 20 firms in their portfolio in some random store. This, thus, influences the arrangement estimate the funding firm should target. For instance, if the investment firm has one hundred million dollars under administration, its normal arrangement size ought to be near five million dollars (Klonowski 2010).

Net Present Value

The net present value (NPV) is the difference between the present value of cash inflows and the cash outflows. NPV estimates the amount of wealth that the project creates. Decision Criteria: Investment projects should be accepted if the NPV of the project is positive and should be rejected if the NPV is negative (Titaman, Keown and Martin 2014) Page 358-382.

Calculating an Investment's NPV

$$\text{Net Present Value or } NPV = \underbrace{\text{Cash Flow for Year 0 } (CF_0)}_{\text{Cost of making the investment = Initial cash flow, this is typically a cash outflow taking on a negative value.}} + \underbrace{\frac{\text{Cash Flow for Year 1 } (CF_1)}{\left(1 + \text{Discount Rate } (k)\right)^1} + \frac{\text{Cash Flow for Year 2 } (CF_2)}{\left(1 + \text{Discount Rate } (k)\right)^2} + \cdots + \frac{\text{Cash Flow for Year } n \ (CF_n)}{\left(1 + \text{Discount Rate } (k)\right)^n}}_{\text{Present value of the investment's cash inflows = Present value of the project's future cash inflows.}}$$

Example 1 (Titaman, Keown and Martin 2014) Page 358-382:

XYZ Company provides the internet services to resistance dealers located in Erbil, North industry area. The opening expense is $3 million and, management estimates that the firm might generate cash flows for years one through five equals to $600,000; $850,000; $3,600,000; $2,000,000; and $3,000,000. XYZ Company a 12% discount rate for projects of this category. Is this a good speculation opportunity?

In this there is 3 million as expenses and the other five cash flows are out of a million so, we have to each year dividing by a million.

Year one = $600,000 / $1,000,000 = 0.6m

Year two = $850,000/ $1,000,000= 0.85m

Year three = $3,600,000/ $1,000,000 = 3.6m

Year four = $2,000,000 / $1,000,000 = 0.2m

Year five = $3,000,000 / $1,000,000 = 0.3m

k = 12% → 12 / 100 = 0.12 it means the XYZ company only has 12 percent discount.

k = 12%

Years	0	1	2	3	4	5
Cash flows (In $ millions)	-$3	+$0.6	+$0.85	+$3.6	$2	$3

Net Present Value = **$17,022,808,671,808**

We must calculate and evaluate the cash flows to identify this is the good investment opportunity! We will understand by calculate the Net Present Value which is (NPV), that is requires calculation of the present value of all cash flows.

First Step:

NPV = -$3m + $0.6m/ $(1.12) + \$0.85m/ (1.12)^2 + \$3.6m/ (1.12)^3 + \$2m/ (1.12)^4 + \$3m/ (1.12)^5$

NPV = -$3,000,000 + $53.57142857 + $67.7614795918 + $2.5624088921+ $127.103615681 +

$1,702,280.5671557

NPV = $17,022,808,671,808

The project requires an initial investment of $3,000,000 and generates futures cash flows that have a present value of $17,022,808,671,808. Consequently, the project cash flows are more than the required investment. Since the NPV is positive, the project is an acceptable project.

Independent Investment Opportunity It is requiring two steps to evaluate:

Calculate NPV;

Accept the project if NPV is positive and reject if it is negative.

Evaluating Mutually Exclusive Investment Opportunities

Following are two situations where firm is faced with mutually exclusive projects:

Substitutes – When a firm is analyzing alternative investments, and each performs the same function.

Firm Constraints – Firm faces constraints such as limited managerial time or limited financial capital that limit its ability to invest in all the positive NPV projects.

Choosing Between Mutually Exclusive Investments

If mutually exclusive investments have equal lives, we will calculate the NPVs and choose the one with the higher NPV.

If mutually exclusive investments do not have equal lives, we must calculate the Equivalent Annual Cost (EAC), the cost per year. We will then select the one that has a lower EAC.

Equivalent Annual Cost (EAC)

(Brigham, Gapenski and Ehrhardt 1999).

The cost per year of possessing and operating an asset over the period projects it is calling Equivalent Annual Cost. That is dividing the NPV of the speculation by the PVC of annuity factor.

$$\begin{matrix}\textit{Equivalent}\\ \textit{Annual Cost (EAC)}\end{matrix} = \frac{\begin{matrix}\textit{PV of Costs}\end{matrix}}{\begin{matrix}\textit{Annuity Present Value}\\ \textit{Interest Factor}\end{matrix}} = \frac{CF_0 + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \cdots + \frac{CF_n}{(1+k)^n}}{\left(\frac{1}{k} - \frac{1}{k(1+k)^n}\right)} = \frac{NPV}{\left(\frac{1}{k} - \frac{1}{k(1+k)^n}\right)}$$

Example 2:

What is the EAC for a machine that costs $30,000, requires payment of $2,000 per year for maintenance and operation expense, and lasts for 4 years? You may assume that the discount rate is 9% and there will be no salvage value associated with the machine. In addition, you intend to replace this machine at the end of its life with an identical machine with identical costs.

k = 8%

Years	1	2	3	4
Cash flows (In $, thousands)	-$30	-$2	-$2	-$2

EAC = $17,145.86.

Solution First Step:

Here we need to calculate the EAC, which will tell us the annual cost for a machine that lasts 6 years. EAC can be computed using a mathematical formula or financial calculator.

Calculation of NPV

$$\begin{matrix}\text{Net Present}\\ \text{Value or } NPV\end{matrix} = \begin{matrix}\text{Cash Flow}\\ \text{for Year 0 } (CF_0)\end{matrix} + \frac{\begin{matrix}\text{Cash Flow}\\ \text{for Year 1 } (CF_1)\end{matrix}}{\left(1 + \begin{matrix}\text{Discount}\\ \text{Rate } (k)\end{matrix}\right)^1} + \frac{\begin{matrix}\text{Cash Flow}\\ \text{for Year 2 } (CF_2)\end{matrix}}{\left(1 + \begin{matrix}\text{Discount}\\ \text{Rate } (k)\end{matrix}\right)^2} + \cdots + \frac{\begin{matrix}\text{Cash Flow}\\ \text{for Year } n\ (CF_n)\end{matrix}}{\left(1 + \begin{matrix}\text{Discount}\\ \text{Rate } (k)\end{matrix}\right)^n}$$

Cost of making the investment = Initial cash flow, this is typically a cash outflow taking on a negative value.

Present value of the investment's cash inflows = Present value of the project's future cash inflows.

Calculation of EAC

$$EAC = \frac{NPV}{A_{t,r}}, \text{ where } A_{t,r} = \frac{1 - \frac{1}{(1+r)^t}}{r}$$

r → annual interest rate

t → number of years

NPV = -\$30/ (1.08) + -\$2/ $(1.08)^2$ + -\$2/ $(1.08)^3$ + -\$2/ $(1.08)^4$

NPV = 27.777777+1.7146776406+1.58766482+1.4700597056

= 32.5501791662

First Step:

NPV = -\$30,000 + PV of \$2,000 each year

= -\$30,000 + -\$2,000 (PV of Annuity Factor)

= -\$30,000 + -\$2,000 {[1-(1/ $(1.08)^4$] ÷ (.08)}

= -\$30,000 + -\$2,000 {3.31212684) = -**32.5501791662**

EAC = NPV ÷ Annuity Factor

= -\$32.5501791662÷ 3.31212684

= -\$10.17544 EAC indicates the annual cost that is adjusted for time value of money.

Profitability Index (Titaman, Keown and Martin 2014) Page 358-382:

The profitability index (PI) is a cost-benefit ratio equal to the present value of an investment's future cash flows divided by its initial cost.

Phase One: If PI is greater than one, the NPV will be positive and the investment should be accepted.

Phase Two: When PI is less than one, which indicates a bad investment, NPV will be negative and the project should be rejected.

Specific methods such as the profitability index, which involve 'juggling' positive NPV project expenditures to ensure that total combined NPV is maximized from the investment decision, can handle decisions associated with a single constraint However, when two or more constraints are present, mathematical programming techniques such as linear programming become very handy (Dayananda, et al. 2002) Page 204.

Example 3 (Dayananda, et al. 2002) Page 15:

XYZ Company is considering an investment in a new automated materials handling system that is expected to reduce it is the production cost by eliminating much of the waste the time and currently involved in its specialty packaging the goods. The new system will require an initial investment of \$30,000 and is expected to provide cash savings over the next four-year period.

Year	Expected Cash Flow
0	-\$50,000
1	\$15,000
2	\$8,000
3	\$10,000
4	\$12,000

k = 10%

Years	0	1	2	3	4
Cash flows (In $, thousands)	-$50	+$15	+$8	+$10	+$12

PI = **0.99187**

The PI for a project is equal to the present value of the project's expected cash flows for years 1-4 divided by the initial outlay.

PI = PV of expected cash flows ÷ -Initial outlay 6.512943105

We can proceed in two steps:

Compute PV of expected cash flows by discounting the cash flows from Year 1 to Year 4 at 10%.

$$PV_t = CF_t \div (1.09)^t$$

Calculate PI

Year	Expected Cash Flow	Present Value at 8% discount rate
0	-$50,000	$13,636.36
1	$15,000	$6,611.57
2	$8,000	$7,513.14
3	$10,000	$8,196.16
4	$12,000	$13,636.36
NPV of Expected Cash flows, Years 1-4		$49,593.59

PI = PV of expected CF_{1-4} ÷ Initial Outlay

$$= \frac{\text{PV of Future Cash Flows}}{\text{Initial Investment}}$$

= $49,593.59 ÷ $50,000

= 0.99187

It is not acceptable investment because the PI is less than One the acceptable investment should be equal or more One.

Internal Rate of Return

The internal rate of return (IRR) of an investment is equivalent to the yield to maturity. Specifically, the IRR is the discount rate that results in a zero NPV for the project (Agar 2005) Page 160. The internal rate of return is a measure of the total rate of return from an investment that takes account of capital redemptions, possible capital gains, and income from dividends. Its value depends on factors like risk, investment duration, ease of exit and competition for the deal. The internal rate of return is the discount rate that equalizes the present value of cash outflows with the present value of cash inflows. See any practitioner-based manual on venture capital investment (Reid 1998) Page 111.

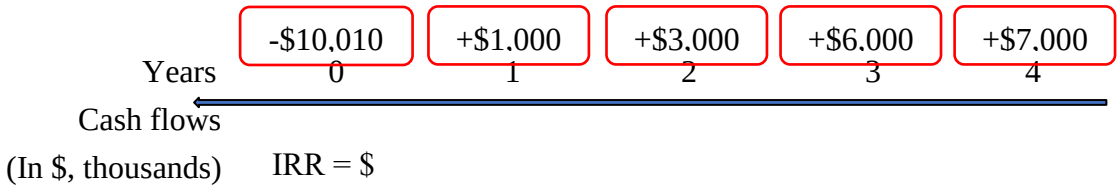
$$\text{Net Present Value} = \text{Cash Flow for Year 0 } (CF_0) + \frac{\text{Cash Flow for Year 1 } (CF_1)}{\left(1 + \text{Internal Rate of Return } (IRR)\right)^1} + \frac{\text{Cash Flow for Year 2 } (CF_2)}{\left(1 + \text{Internal Rate of Return } (IRR)\right)^2} + \cdots + \frac{\text{Cash Flow for Year } n\ (CF_n)}{\left(1 + \text{Internal Rate of Return } (IRR)\right)^n} = 0$$

The criteria decision of internal rate of return, Accept the project if the IRR is greater than the required rate of return or discount rate, and reject it otherwise (Wilson and Geoff 2004) P 13-14.

Example 4 (Titaman, Keown and Martin 2014) Page 358-382.

Knowledge Associates is a small consulting firm in Portland, Oregon, and they are considering the purchase of a new copying center for the office that can copy, fax, and scan documents. The new machine costs $10,010 to purchase and is expected to provide cash flow savings over the next four years of $1,000; $3,000; $6,000; and $7,000.

The employee in charge of performing financial analysis of the proposed investment has decided to use the IRR as her primary criterion for making a recommendation to the managing partner of the firm. If the discount rates the firm uses to value the cash flows from office equipment purchases is 15%, is this a good investment for the firm?



Here we must calculate the project's IRR. IRR is equal to the discount rate that makes the present value of the future cash flows (in years 1-4) equal to the initial cash outflow of $10,010.

We can calculate the IRR using trial & error, financial calculator or an excel spreadsheet.

For further solution in using the mathematic methods we must:

This will require finding the rate at which NPV is equal to zero.

We calculate the NPV at different rates to determine the range of IRR

The new copying center requires an initial investment of $10,010 and provides future cash flows that offer a return of 19%. Since the firm has decided 15% as the minimum acceptable return, this is a good investment for the firm.

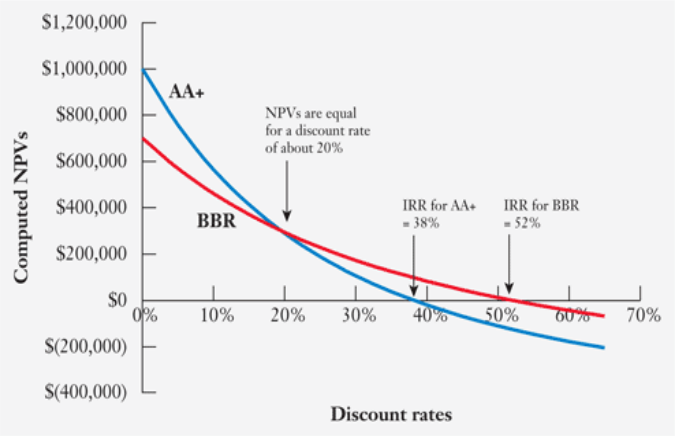
If the cash flow pattern is non-conventional i.e. cash inflow followed by a series of cash outflows (as in the case of a loan), NPV greater than zero indicates that IRR is less than the discount rate used to calculate the NPV.

NPV leads to the appropriate decision in both conventional and unconventional cash flow pattern.

Although any project can have only one NPV, a single project can, under certain circumstances, have more than one IRR. Checkpoint 11.5 illustrates a case of multiple IRRs.

(Panel B) NPV Profiles

NPV Profiles		
Discount Rate	AA+	BBR
0%	$1,000,000	$700,000
5%	$ 756,639	$568,722
10%	$ 565,259	$460,528
15%	$ 412,730	$370,241
20%	$ 289,673	$294,046
25%	$ 189,280	$229,088
30%	$ 106,532	$173,199
35%	$ 37,680	$124,709
40%	$ (20,111)	$ 82,317
45%	$ (69,011)	$ 44,998
50%	$ (110,700)	$ 11,934
55%	$ (146,489)	$ (17,531)
60%	$ (177,414)	$ (43,930)
65%	$ (204,298)	$ (67,701)



Modified Internal Rate of Return

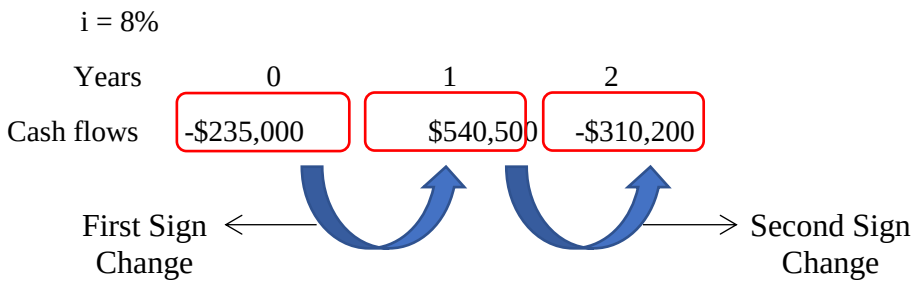
The internal rate of return is an alternative measure for evaluating projects. It is the calculated rate of return (or discount rate) at which the NPV will be equal to zero. In project evaluation this rate must be equal to or greater than the required rate of return for the project to be acceptable (Dayananda, et al. 2002) Page 86.

According to (Titaman, Keown and Martin 2014) Page 358-382. Eliminates the problem of multiple IRR and MIRR rearranges the project cash flows such that there is only one change in the sign of the cash flows over the life of the project. There are two steps to computing MIRR.

Modify the project's cash flow stream by discounting the negative future cash flows back to the present using the discount rate. The present value of these future negative cash flows is then added to the initial outlay to form a modified project cash flow stream

MIRR = IRR (modified cash flow stream).

For example: Analyze the MIRR for the preceding problem where the required rate of return used to discount the cash flows is 8%. What is the MIRR?



If we use IRR, we will get multiple IRRs as there are two sign changes in cash flow stream.

We can use MIRR by doing the following:

First, discount the year 2 negative cash flows back to year 0 using the 8% discount rate.

Second, calculate the MIRR of the resulting cash flows for years 0 and 1.

If the firm gets the Discount the year 2 negative cash flows to year 0.

Years	0	1	2
Cash flows	-$235,000	$540, 50	-$310,200
	-$265,947		
	-$500,947		

The modified cash flow stream is as follows:

Years	0	1	2
Cash flows	-$500,947	$540,500	-$0

Calculating the IRR for the above modified cash flows produces MIRR equal to 7.9%

Payback Period

Pay-back period Making an equity investment 'on a PE of 10' would mean that an investor has to wait ten years before recouping the original investment. This is a rough cut, because it assumes that investors receive a yearly income (dividend) equal to their share of net earnings (since they have paid ten times earnings, not dividends), ignoring the time value of money (Costantini 2006) Page 25. The Payback period for an investment opportunity is the number of years needed to recover the initial cash outlay required to make the investment. In Payback Period it is Accept the project if the payback period is less than a pre-specified maximum number of years.

Payback period is the limited that is compromising the time value of money, cash flows and utilizes cutoff standard (Titaman, Keown and Martin 2014) Page 358-382.

It ignores the time value of money

It ignores cash flows that are generated by the project beyond the end of the payback period.

It utilizes a chance cutoff standard.

Discounted payback period approach is similar except that it uses discounted cash flows to calculate the payback period. Accept the project if its discounted payback period is less than the pre-specified number of years.

Project Long

	Annual Cash Flows	Cumulative Cash Flows	Discounted Cash Flows	Cumulative Discounted Cash Flows
Initial cash outlay	$(100,000)	$(100,000)	$(100,000)	$(100,000)
Year 1	70,000	(30,000)	59,829	(40,171)
Year 2	**30,000**	**0**	**21,915**	**(18,256)**
Year 3	30,000	30,000	18,731	476
Year 4	25,000	55,000	13,341	13,817
Year 5	10,000	65,000	4,561	18,378

Discounted Payback equals 2.97 years for Project Long! Three years of discounted cash flows sum to a positive $476. However, since we need to sum to 0 we do not need a full three years of discounted cash flows (we need $18,256/$18,731 = .97 of Year 3's cash inflow).

Project Short

	Annual Cash Flows	Cumulative Cash Flows	Discounted Cash Flows	Cumulative Discounted Cash Flows
Initial cash outlay	$(100,000)	$(100,000)	$(100,000)	$(100,000)
Year 1	50,000	(50,000)	42,735	(57,265)
Year 2	**50,000**	**0**	**36,526**	**(20,739)**
Year 3	–	–	–	(20,739)
Year 4	–	–	–	(20,739)
Year 5	–	–	–	(20,739)

Discounted payback is *never* achieved for Project Short! The discounted cash flows never cumulate to equal zero.

Finding and Conclusion:

The research study is included the financial criteria measuring the capital budgeting and maximize the projects in terms of assets, capital budgeting for the investments, and the efficient times for the rate of return depend on the net present value that is shows the amount capitals inflow and out flow. Moreover, in this analytically study identify there is strong relationship between the net present value and equivalent annual cost that is has impact the maximize profits and internal rate return according to the payback period. Furthermore, the first research objectives reached to arrange the investment plan to maximize the net present value and depend on equivalent annual cost investors can utilize the capital of investments, and the projects implementation can be optimizing the cost benefits through profit index analysis. The NPV technique depends on the idea of net present esteem and demonstrates the sum by which the total venture wage surpasses the total installments. At this review if, NPV > 0, the venture is viewed as viable and the other way around when NPV < 0. The task is viewed as incapable from the monetary perspective and is rejected. A markdown rate at which the NPV is equivalent to zero is known as the inward rate of return of an undertaking. IRR relies upon internal task parameters just that depict the speculation venture itself, without any employments of net benefit past the undertaking being broke down. The IRR strategy is generally the need one as it is more justifiable and evident to financial specialists. In the principal phase of examination, four key gatherings of assessment come about are resolved. Typical and strife cases are recognized in these gatherings. In ordinary cases, where there is a connection be tween's the NPV and IRR comes about, a choice on a task is made relying upon the ascertained esteems: when NPV is certain and IRR is higher than the material markdown rate, the undertaking is acknowledged; else it is rejected.

Future research:

In future of study can be conducted with further analysis by the real data evaluation depend on that five criteria of capital investment evaluation NPV, EAC, PI, IRR and Payback Period. It can be the proposed investment or the real investment projects that decide to be impalement in the future.

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