

KEMENTERIAN PENDIDIKAN TINGGI JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

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CAPITAL BUDGETING: The Basics of Finance

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First Publication: 2024

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> Published by: Politeknik Ungku Omar Jalan Raja Musa Mahadi, 31400, Ipoh, Perak Malaysia EISBN: 978-629-7635-45-3

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ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful. All praise is due to Allah, for without His blessings this e-book on Capital Budgeting would not have been possible.

We would like to express our deep and sincere gratitude to the management of Politeknik Ungku Omar for giving us the opportunity and invaluable guidance to come up with this ebook. Without support from the institution this e-book would not exist.

We would also like to extend our deepest appreciation to Encik. Azahar bin Ahmad, our Head of Department, Puan Norzihan bt Mohamad, the Head of Programme, and all our colleagues in Banking and Finance Programme for their kind support.

We are profoundly grateful to our family, whose patience and understanding have been invaluable throughout the journey. Their love, encouragements and continuous pray have made us strong and resilient towards completing this e-book.

Last but not least, we would like to thank everybody who was as much important for their contribution and support to the successful realization of this e-book. It is our sincere hope that this e-book will be beneficial and useful for anyone who is interested in acquiring insight into capital budgeting.

- Zakiah & Nor Husna Shafini –

PREFACE

We are delighted to introduce to you the first e-book for Business Finance course. We are very much excited to embark on this journey of exploring into the basics of finance with you. The intricacies of business finance can often seem daunting, but with clear explanations the concept followed by simple yet practical examples, we aim to make capital budgeting concept accessible and engaging.

Capital budgeting, in particular, is a critical aspect that influences strategic decisions of businesses. Understanding the know-how of evaluating investment opportunities and effective resources allocation is indeed fundamental for long-term financial success.

The organization of topics in this e-book provides a soft blending of theoretical knowledge and practical application for students who are learning business finance. Each is progressively built to ensure a unified and cohesive learning experience. A simple real-world scenario is included to demonstrate the principles discussed and illustrate their relevance in a real business setting.

It is our most desired intention to empower you with the knowledge and tools necessary to make informed financial decisions. We trust that this e-book will be an invaluable resources and guide as you work on your journey to become proficient in business finance.

Thank you for choosing this e-book. Let's dive into the fascinating world of capital budgeting and uncover the potential benefit it holds for your business endeavors.

CAPITAL BUDGETING

THE BASICS OF FINANCE:

About the e-book

This e-book is organized through division of capital budgeting into 5 sections to exhibit everything essential to understand the basics of finance. Separation between each section is made by using Canva background.

The 5 sections are as follows:

(i) Definition of capital budgeting concept and its importance.

(ii) The processes involved in capital budgeting.

(iii) 2 types of project evaluated for capital budgeting.

(iv) Capital budgeting evaluation techniques

(v) Methods of evaluation capital budgeting

Each section is explained using simple English terms to help students who are beginners to understand all about capital budgeting. A real case scenario is used to exhibit how capital budgeting methods are applied for financial decision making. The solution is written in an easy step-bystep for students to follow. The reference materials and resources are also listed at the end of the e-book.

LEARNING OUTCOME

At the end of this topic, you should be able to:

- a) Explain capital budgeting concept.
- b) Describe the processes involved in capital budgeting.
- c) Apply the project valuation techniques as follows:
 - (i) Payback period
 - (ii) Net present value
 - (iii) Internal rate of return
 - (iv) Profitability index



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Definition of Capital Budgeting

Capital budgeting is the process by which businesses evaluates and decides on their long-term investments and expenditures.

- It revolves around the analysis of potential investment opportunities.
 - Finance Manager will conduct a careful evaluation of the initial cash outlay, anticipated cash inflows, and future cash outflows of the potential investments prior to final selection.

These investments or expenditures may include acquisition of a new machinery. expansion of production facilities. development of new products. or other significant capital projects.

- As investment appraisal, Finance Manager evaluates significant investments, expenditures or any other financial commitments aiming to foster long-term business operations such as:
 - Upgrading equipment or facilities
 - Purchasing new machinery or tools
 - Initiating a business expansion into untapped markets
 Undertaking renovations of existing property
 - Launching novel products
 - Recruiting additional personnel

Definition of Capital Budgeting

The primary goal of capital budgeting is to maximize a company's value by allocating its resources to the most profitable projects.

• The aim is to ascertain whether the potential investment will yield a profitable return over a specified time period. Finance Manager will analyze a list of longterm investments to see if they align with a company's goals and create value. I I OWANCE

Why Capital Budgeting matters

- It allows Finance Manager or decision maker to carefully consider their investment options.
 --- see the impact of how it will affect the company.
- 2. It allows Finance Manager or decision maker to compare the options (potential projects) before selecting one that will benefit both the business and company's shareholders.
 - --- value (how much profit to gain, tenure/ timing, resource optimization)
 - --- expansion @ growth potential.





Step 1: Project Identification

Generating long-term investment proposals which are consistent with a firm's long-term objectives.

Step 5: Performance Review

Re-evaluating these projects from time to time for control purposes and carrying out post-audits for completed projects.



Step 2: Evaluation

Estimating the relevant after-tax incremental cash flows for these project proposals.





Step 4: Implementation

Selecting the project that will maximize shareholder's wealth

Step 3: Budget Approval Evaluating these cash flows





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2 Types of Capital Budgeting Projects

INDEPENDENT PROJECTS

 These are projects with cash flow, which are independent or unrelated to one another.

 Hence, a decision to accept one project will not affect the decision to accept another. These are projects where a decision is made to choose only one project from the many being considered.

ii.

MUTUALLY EXCLUSIVE

PROJECTS

 Therefore, a decision to accept one will automatically mean a rejection of the others.



TYPE 1: NON-DISCOUNTED CASH FLOW ANALYSIS

The cash flow will not be discounted, this means that the present value concept is not applied in this method.





Timing of the cash flows does not make any difference to the evaluation.

The most popular method under this category is payback period.





TYPE 2: DISCOUNTED CASH FLOW ANALYSIS

Cash inflows and outflows from a capital budgeting project will be discounted according to the time value of money concept.





The methods under this category include net present value, profitability index and internal rate of return. Different timing of returns will give different values. The earlier the cash received or paid, the higher its value would be.





The following pages will explore these four (4) methods complete with problem and solution for better understanding of how Finance Manager uses these methods to analyze potential projects or investments.



PAYBACK PERIOD (PP)

1

It measures the amount of time (number of years) required to recoup the cost of an initial investment via the cash flows generated.

It estimates how quickly the firm can recover its initial outlay. --> the sooner the better.

It calculates the timing differences between projects from the date of it's initial investment (i.e., project cost) to the date when the break-even point has been reached.

The cash flows from the investment could be an annuity or uneven series.

** Uneven series – the year cash inflow must be accumulated until the initial investment is recovered.

PP annuity = <u>Initial Outlay (IO)</u> Annual Cash inflows

PP *uneven = (Yr – 1) + [(<u>IO – Accumulated CF before Yr)</u> CF in Yr

PAYBACK PERIOD (PP)

What is a Good Payback Period?

The rule of thumb:

the shorter the payback period --> the more attractive the investment --> lesser risk of losing capital --> and the better off the company would be.

In contrast, the longer it takes for a project to "pay for itself", the less attractive the project becomes as it implies reduced profitability.

A longer payback time, suggests that the invested capital is going to be tied up for a long period (risk).





Exercise Question

Adilah Trading is considering these two mutually exclusive project which required an initial outlay of RMI60,000. Below are the cash flows expected from each project. The cost of capital is 12%.

Which project would you choose?

Year	Project Emas (RM)	Project Perak (RM)
1	45,000	40,000
2	46,000	40,000
3	47,000	40,000
4	48,000	40,000
5	49,000	40,000



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Uneven cashflow

Year	Project Emas (RM)	Accumulated CF
1	45,000	45,000
2	46,000	91,000
3	47,000	138,000
4	48,000 🖌	186,000
5	49,000	

PP *uneven = (Yr - 1) + [(IO - Accumulated CF before Yr))CF in Yr = 4 - 1 + (160,000 - 138,000) 48,000= 3 + 22,000 48,000= 3 + 0.46= **3.46 years**

Annuity @ an even cashflow

Year	Project Perak (RM)
1	40,000
2	40,000
3	40,000
4	40,000
5	40,000



DECISION:

The Project EMAS will be chosen as the payback is earlier.



NET PRESENT VALUE (NPV)

Is the difference between the present value of a project's cash inflows and the present value of cash outflows (its initial investment) over a period of time.

NPV stresses the timing of cash flows.

2

Focus on finding the current value of a future stream of payments.





NET PRESENT VALUE (NPV)





Exercise Question

Adilah Trading is considering these two mutually exclusive project which required an initial outlay of RMI60,000. Below are the cash flows expected from each project. The cost of capital is 12%.

Which project would you choose?

Year	Project Emas (RM)	Project Perak (RM)
1	45,000	40,000
2	46,000	40,000
3	47,000	40,000
4	48,000	40,000
5	49,000	40,000



NPV (P	NPV (PROJEK EMAS) Refer PVIF table									
Year	CF	PVIF (12%, 5)	PV							
1	45,000	0.8929	40,180.50							
2	46,000	0.7972	36,671.20							
3	47,000	0.7118	33,454.60							
4	48,000	0.6355	30,504.00							
5	49,000	0.5674	27,802.60							
ΣΡV			168,612.90							
-10			(160,000.00							
NPV			8,612.90							

Table A-3 Present Value Interest Factors for One Dollar Discounted at k Percent for n Periods: PVIF

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972
	0.0400	0.0000	0.0075	0.7000	0.7460	0 7050	0.6660	0.6000	0.5060	0.5645	0.5346	A 2000	0.4000	0 4550	0.4303

DECISION : The NPV is positive, ACCEPT.

NPV (PROJEK PERAK)

Refer PVIFA table

Year	ACF	PVIFA (12%, 5)	ΣΡV
ΣΡ٧	40,000	3.6048	144,192.00
-10			160,000.00
NPV			(15,808.00)

Table A-4 Present Value Interest Factors for a One-Dollar Annuity Discounted at k Percent for n Periods: PVIFA = [1 - 1/(1 + k)ⁿ] / k

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5278	1.4568	1.4400	1.3609
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2459	2.1065	1.9813	1.9520	1.8161
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137	2.8550	2.7982	2.5887	2.4043	2.3616	2.1662
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.695	3.6048	3.5172	3.4331	3.3522	3.2743	2.9906	2.7454	2.6893	2.4356
											•									

DECISION : The NPV is negative, REJECT..



DECISION : Project EMAS will be chosen because NPV POSITIVE



PROFITABILITY INDEX (PI)



PROFITABILITY INDEX (PI)

What is a Good Profitability Index (PI)?

The higher the ratio, the more attractive the proposed project is, and the more likely it will be pursued.

This accept-reject criterion of PI can be stated as:

PI =1 \rightarrow Neutral or Acceptable

- PI >1 \rightarrow Approve Project
- PI <1 → Reject Project



2



Exercise Question

Adilah Trading is considering these two mutually exclusive project which required an initial outlay of RMI60,000. Below are the cash flows expected from each project. The cost of capital is 12%.

Which project would you choose?

Year	Project Emas (RM)	Project Perak (RM)
1	45,000	40,000
2	46,000	40,000
3	47,000	40,000
4	48,000	40,000
5	49,000	40,000



PROFITABILITY INDEX (PROJEK EMAS)

	Project Emas (RM)	
ΣΡV	168,612.90	on page 18
Ю	160,000.00	
PI	1.05	

Profitability Index = <u>PV of cash flow</u> Initial Outlay

Project Emas = <u>168,612</u> 160,000 = **1.05**

DECISION : PI > 1.0 , ACCEPT.



DECISION : Project EMAS will be chosen because PI is > than 1.00.

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PROFITABILITY INDEX (PROJEK PERAK)

	Project Perak (RM)					
ΣΡV	144,192.00	Refer∑PV on page 19.				
IO	160,000.00					
PI	0.90					
		Mon				
Profitability Inde	ex = <u>PV of cash flow</u> Initial Outlay	1 By F				
Project Perak = =	144,192.00 160,000 0.90					
DECISI	ON : PI < 1.0, REJECT					
	DECISION :					

INTERNAL RATE OF RETURN (IRR)

It is the discount rates that equates the present value of the project's future net cash flows with the project's initial cash outlay.

--> the expected compound annual rate of return that will be earned on a project or investment.

IRR helps determine the yield of the rate of return on an investment or a project (estimate the profitability of potential investments).

It allows Finance Manager to compare and rank projects based on their projected yield : the highest is usually preferred.

IRR is expressed as follows:

4

$$0 = NPV = \sum_{t=1}^{T} \frac{C_t}{(1 + IRR)^t} - C_0$$

where:

 $C_t =$ Net cash inflow during the period

 $C_0 = \text{Total initial investment costs}$

IRR = The internal rate of return

t = The number of time periods

INTERNAL RATE OF RETURN (IRR)

What is a Good Internal Rate of Return (IRR)?

The higher the rate, the more profitable a potential investment will likely be, and the more likely it will be pursued.

This accept-reject criterion can be stated as:

IRR ≥ Required rate of return : Accept @ higher
IRR < Required rate of return : Reject</p>





Exercise Question

Adilah Trading is considering these two mutually exclusive project which required an initial outlay of RMI60,000. Below are the cash flows expected from each project. The cost of capital is 12%.

Which project would you choose?

Year	Project Emas (RM)	Project Perak (RM)
1	45,000	40,000
2	46,000	40,000
3	47,000	40,000
4	48,000	40,000
5	49,000	40,000



The solution



INTERNAL RATE OF RETURN (IRR) PROJECT EMAS

You need to find :

- 1. ΣPV that is higher than IO
- **2.** ΣPV that is lower than IO

To increase ΣPV , lower the rate To decrease ΣPV , increase the rate

As the ΣPV (12%) is higher than the IO which is RM168,612.90, we have to choose a higher discount rate (15%).



Year	ACF	PVIF (15%, 5)	ΣΡ٧
1	45,000	0.8696	39,132.00
2	46,000	0.7561	34,780.60
3	47,000	0.6575	30,902.50
4	48,000	0.5718	27,446.40
5	49,000	0.4972	24,362.80
			156,624.30

Do Interpolation method : $IRR = a + [(c/d) \times (b - a)]$

a) 12% = 168,612.90 X % = 160,000.00

c) 168,612.90 - 160,000.00 = 8,612.90

b) 15% = 156,624.30

d) 168,612.90 - 156,624.30 = 11,988.60

INTERNAL RATE OF RETURN (IRR) PROJECT EMAS

Do the calculation : plug in the figures from interpolation earlier



INTERNAL RATE OF RETURN (IRR) PROJECT PERAK

You need to find :

- 1. ΣPV that is higher than IO
- **2.** ΣPV that is lower than IO

To increase ΣPV , lower the rate To decrease ΣPV , increase the rate

STEP 1: Find PVIFA IRR,5y factor



IO = Annuity (PVIFA IRR,5y) 160,000 = 40,000 (PVIFA IRR,5y) <u>160,000</u> = PVIFA IRR,5y 40,000 4 = PVIFA IRR,5y

STEP 2 : Refer to PVIFA table, note that 4.0000 lies between 7% (4.1002) and 8% (3.9927).



Table A-4 Present Value Interest Factors for a One-Dollar Annuity

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	Γ
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	Γ
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	Γ
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	ſ
											Г









INTERNAL RATE OF RETURN (IRR) PROJECT EMAS





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