KEUANGAN PERUSAHAAN

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Vera Intanie Dewi

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Universitas Kristen Krida Wacana

MATERI

- Capital Budgeting
- Working Capital and Current Assets Management
- Cash & Marketable Securities Management
- Receivable Management
- Inventory Management
- Leverage & Capital Structure
- Deviden Policy
- Leasing

#8.
CAPITAL BUDGETING TECHNIQUES

OVERVIEW OF CAPITAL BUDGETING

- **Capital budgeting** is the process of evaluating and selecting long-term investments that are consistent with the firm's goal of maximizing owner wealth.
- A **capital expenditure** is an outlay of funds by the firm that is expected to produce benefits over a period of time *greater than* 1 year.
- An **operating expenditure** is an outlay of funds by the firm resulting in benefits received *within* 1 year.

DEFINITION (1)

- Capital budgeting is the process of deciding investment projects which create in maximization of shareholder value (Dayananda et al.,2002)
- Capital budgeting.is the process of evaluating investment opportunities and making investment decisions (Meyer & Kiymaz dalam Baker & English,2011)
- Capital budgeting is mostly dealt with sizable investments in long term assets. Assets can be either tangible such as building, plant, or equipment or intangible assets such as patents, new technology or trade mark (Brealey and Myers, 2003).

Sources: Kengatharan (2016)

DEFINITION (2)

- Capital budgeting is not a short term aspects,generally prepared a year in advance and extendable to five, ten or even fifteen years in future (Brickley, 2006).
- Capital budgeting is the process of analyzing and selecting investment opportunities in long term assets where its benefits last for more than one year (Peterson and Fabozzi (2002) .
- Capital budgeting is the decision process relating to long-term capitalinvestment programmes (Alkaraan & Hopper,2015)

Sources: Kengatharan (2016)

MOTIVES FOR CAPITAL EXPENDITURE

Companies make capital expenditures for many reasons: The primary motives for capital expenditures are to expand operations, to replace or renew fixed assets, and to obtain some other, less tangible benefit over a long period.

STEPS IN THE PROCESS

The capital budgeting process consists of five steps:

- **Proposal generation.** Proposals for new investment projects are made at all levels within a business organization and are reviewed by finance personnel.
- **Review and analysis**. Financial managers perform formal review and analysis to assess the merits of investment proposals
- **Decision making**. Firms typically delegate capital expenditure decision making on the basis of dollar limits.
- **Implementation.** Following approval, expenditures are made and projects implemented. Expenditures for a large project often occur in phases.
- **Follow-up.** Results are monitored and actual costs and benefits are compared with those that were expected. Action may be required if actual outcomes differ from projected ones.

STEPS IN THE PROCESS

- Each step in the process is important.
- Review and analysis and decision making (Steps 2 and 3) consume the majority of time and effort.
- Follow-up (Step 5) is an important but often ignored step aimed at allowing the firm to improve the accuracy of its cash flow estimates continuously. Because of their fundamental importance, this and the following chapters give primary consideration
- to review and analysis and to decision making.

BASIC TERMINOLOGY

- Independent Project vs Mutually Exclusive Projects
- Unlimited Fund vs Capital Rationing
- Accept – Reject vs Ranking Approaches
- Conventional vs Nonconventional Cash Flow Pattern

BASIC TERMINOLOGY

Independent versus Mutually Exclusive Projects

- **Independent projects** are projects whose cash flows are unrelated to (or independent of) one another; the acceptance of one does not eliminate the others from further consideration.
- **Mutually exclusive projects** are projects that compete with one another, so that the acceptance of one eliminates from further consideration all other projects that serve a similar function.

BASIC TERMINOLOGY

Unlimited Funds versus Capital Rationing

- **Unlimited funds** is the financial situation in which a firm is able to accept all independent projects that provide an acceptable return.
- **Capital rationing** is the financial situation in which a firm has only a fixed number of dollars available for capital expenditures, and numerous projects compete for these dollars.

BASIC TERMINOLOGY

Accept-Reject versus Ranking Approaches

- An **accept–reject approach** is the evaluation of capital expenditure proposals to determine whether they meet the firm's minimum acceptance criterion.
- A **ranking approach** is the ranking of capital expenditure projects on the basis of some predetermined measure, such as the rate of return.

Bennett Company is a medium sized metal fabricator that is currently contemplating two projects: Project A requires an initial investment of $42,000, project B an initial investment of $45,000. The relevant operating cash flows for the two projects are presented in Table 10.1 and depicted on the time lines in Figure 10.1.

TABLE 10.1 Capital Expenditure Data for Bennett Company

	Project A	Project B
Initial investment	$42,000	$45,000
Year	Operating cash inflows	
1	$14,000	$28,000
2	14,000	12,000
3	14,000	10,000
4	14,000	10,000
5	14,000	10,000

Sumber:Gitman, 2019

Figure 10.1 Bennett Company's Projects A and B

FIGURE 10.1

Bennett Company's Projects A and B
Time lines depicting the conventional cash flows of projects A and B

CAPITAL BUDGETING TECHNIQUE

- Payback Period
- Discounted Payback Period
- Net Present Value
- Internal Rate Return
- Profitability Index

PAYBACK PERIOD

“how long (in years and/or months) it takes to recover the initial investment.”

The maximum acceptable payback period is determined by management.

Decision Criteria:

- If the payback period <the maximum acceptable payback period = ACCEPT the project.
- If the payback period > the maximum acceptable payback period, REJECT the project.

PAYBACK PERIOD

Advantages

- The payback methodis widely used by large firms to evaluate small projects and by small firms to evaluate most projects.
- It is simple, intuitive, and considers cash flows rather than accounting profits.
- It also gives implicit consideration to the timing of cash flows and is widely used as a supplement to other methods such as NPV & IRR

PAYBACK PERIOD

Weakness

- The appropriate payback period is a **subjectively** determined number.
- Thus, payback fails to fully consider the **time value of money**.
- It also fails to consider the principle of **wealth maximization** because it is not based on **discounted cash flows** and thus provides no indication as to whether a project adds to firm value.

PAYBACK PERIOD

KELEBIHAN:

- MEMBERIKAN INDIKASI RISIKO DAN LIKUIDITAS PROYEK.
- MUDAH MENGHITUNG DAN MEMAHIMINYA.

KEKURANGAN:

- MENGABAIKAN TIME VALUE OF MONEY
- MENGABAIKAN CASH FLOW YG TERJADI SETELAH PERIODE PAYBACK .

TABLE 10.2 Relevant Cash Flows and Payback Periods for DeYarman Enterprises' Projects

	Project gold	Project silver
Initial investment	$50,000	$50,000
Year	Operating cash inflows	
1	$ 5,000	$40,000
2	5,000	2,000
3	40,000	8,000
4	10,000	10,000
5	10,000	10,000
Payback period	3 years	3 years

TABLE 10.3 Calculation of the Payback Period for Rashid Company's Two Alternative Investment Projects

	Project X	Project Y
Initial investment	$10,000	$10,000
Year	Operating cash inflows	
1	$5,000	$3,000
2	5,000	4,000
3	1,000	3,000
4	100	4,000
5	100	3,000
Payback period	2 years	3 years

TABLE 10.1 Capital Expenditure Data for Bennett Company

	Project A	Project B
Initial investment	$42,000	$45,000
Year	Operating cash inflows	
1	$14,000	$28,000
2	14,000	12,000
3	14,000	10,000
4	14,000	10,000
5	14,000	10,000

Payback Project A ($42,000)

= $42,000 / $ 14,000 = 3 years

Payback Project B ($45,000)

Year 1 $28,000
Year 2 40,000 ($28,000+$12,000)
Year 3 $ 5000 (5,000 from $10,000)
Payback = 2.5 Years

For project A, which is an annuity, the payback period is 3.0 years ($42,000 initial investment : $14,000 annual cash inflow).
The payback period for project B is therefore 2.5 years (2 years 1 50% of year 3).

PAYBACK PERIOD-EXERCISE1:

YEAR	PROJECT A	PROJECT B
0	- $ 2,000	-$2,000
1	1,000	200
2	800	600
3	600	800
4	200	1,200

Asumsi i = 10%

Project Manakah yang Anda rekomendasikan? Berikan argumen nya.

PAYBACK PERIOD

YEAR	PROJECT A	PROJECT B
0	- $ 2,000	-$2,000
1	1,000	200
2	800	600
3	600	800
4	200	1,200

		0	1	2	3	4
Project A	NCF	-2,000	1,000	800	600	200
	Cum. NCF	-2,000	-1,000	-200	400	600
Project B	NCF	-2,000	200	600	800	1,200
	Cum NCF	-2,000	-1,800	-1,200	-400	800

If A and B are *independent* , accept project A and project B

If A and B are *mutually exclusive*, then A would be accepted over B

Payback Period A = 2 + (200 / 600) = 2.33 years

Payback Period B = 3 + (400 / 1,200) = 3.33 years

DISCOUNTED PAYBACK PERIOD

		0	1	2	3	4
Project A	NCF	-2,000	1,000	800	600	200
	Disc. NCF	-2,000	909	661	451	137
	Cum. DNCF	-2,000	-1,091	-430	21	158
Project B	NCF	-2,000	200	600	800	1,200
	Disc. NCF	-2,000	182	496	601	820
	Cum DNCF	-2,000	-1,818	-1,322	-721	99

Asumsi i = 10%

Discounted Payback Period A = 2 + (430 / 451) = 2.95 years

Discounted Payback Period B = 3 + (721 / 820) = 3.88 years

If A and B are *independent* , accept both project

If A and B are *mutually exclusive*, accept A over B

PAYBACK PERIOD-EXERCISE2:

Elysian Fields has a max payback period of 6 years and must choose between 2 mutually exclusive projects. Which project meets the standard

	Project A	Project B
Initial Investment	$ 25,000	$ 35,000
Year	Cash Flows	
1	$ 6,000	$7,000
2	6,000	7,000
3	8,000	8,000
4	4,000	5,000
5	3,500	5,000
6	2,000	4,000

Payback period for Project A =

= ($25,000-$6,000-$6,000-$8,000-$4000) =

= $1,000/ $3,500 = 0.29

Payback = 4+0.29 = *4.29 years*

The payback period for Project B =

= ($ 35,000-$7,000-$7,000-$8,000-$5,000-5,000)=

$3,000 / 4,000 = 0.75

Payback = 5+0.75 = *5.75 Years*


ANY
QUESTION

NET PRESENT VALUE

The net present value (NPV) is the present value of all expected cash flows (Peterson & Fabozzi, 2002)

Selisih dari Nilai sekarang dari seluruh arus kas bersih (Net Cash Flow) yang akan diterima dimasa yang akan datang yang telah didiskonto dikurangi dengan nilai investasi awal (Sundjaja et al.,2013)

The basic valuation equation:

$$\text{NPV} = \text{Present value of cash inflows} - \text{Present value of cash outflows} = \sum_{t=1}^{N} \frac{\text{CF}_t}{(1+i)^t}$$

$$\text{NPV} = \text{Present value of cash inflows} - \text{Initial investment}$$

$$\text{NPV} = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - CF_0$$

$$= \sum_{t=1}^{n} (CF_t \times PVIF_{k,t}) - CF_0$$

NET PRESENT VALUE

$$NPV = CF_0 + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \cdots + \frac{CF_n}{(1+k)^n} = \sum_{t=0}^{n} \frac{CF_t}{(1+k)^t}$$

$$NPV_A = -2,000 + \frac{1,000}{(1+10\%)^1} + \frac{800}{(1+10\%)^2} + \frac{600}{(1+10\%)^3} + \frac{200}{(1+10\%)^4} = \$157.64$$

$$NPV_B = -2,000 + \frac{200}{(1+10\%)^1} + \frac{600}{(1+10\%)^2} + \frac{800}{(1+10\%)^3} + \frac{1,200}{(1+10\%)^4} = \$98.36$$

NET PRESENT VALUE

Decision Criteria:

When NPV is used to make accept–reject decisions, the decision criteria are as
follows:

- If the NPV is greater than $0 (NPV > 0), accept the project.
- If the NPV is less than $0 (NPV < 0), reject the project.
- NPV = 0,technically indifferent

If the NPV is greater than $0, the firm will earn a return greater than its cost of capital.

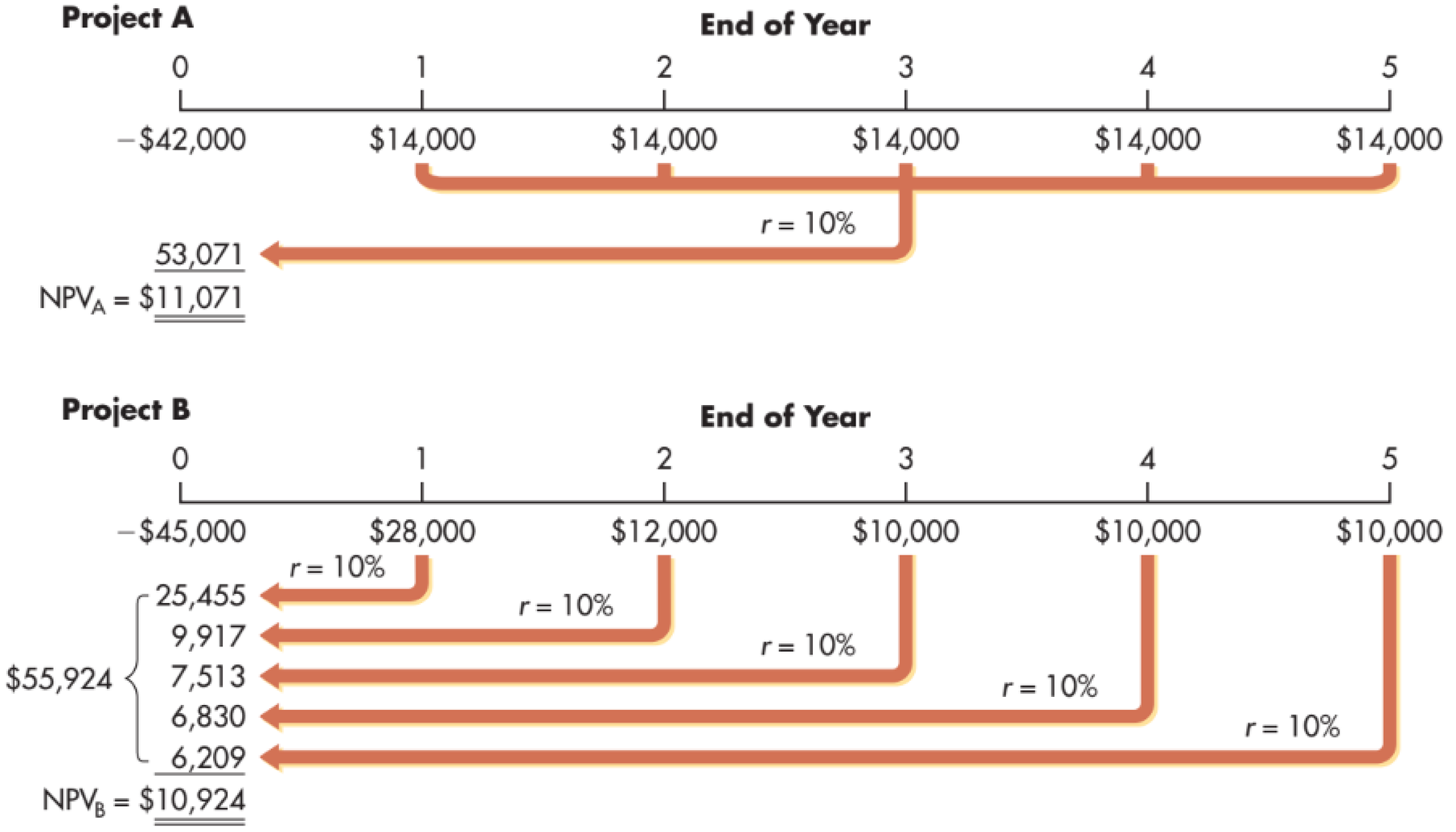
NET PRESENT VALUE-EXAMPLE

Using the Bennett Company data from Table 10.1, assume the firm has a 10% cost of capital. Based on the given cash flows and cost of capital (required return), the NPV can be calculated as shown in Figure 10.2

FIGURE 10.2

Calculation of NPVs for Bennett Company's Capital Expenditure Alternatives

Time lines depicting the cash flows and NPV calculations for projects A and B



Spreadsheet use

The Net Present Value can be calculated as shown on the following Excel spreadsheet.

	A	B	C
1	DETERMINING THE NET PRESENT VALUE		
2	Firm's cost of capital		10%
3		Year-End Cash Flow	
4	Year	Project A	Project B
5	0	$ −42,000	$ −45,000
6	1	$ 14,000	$ 28,000
7	2	$ 14,000	$ 12,000
8	3	$ 14,000	$ 10,000
9	4	$ 14,000	$ 10,000
10	5	$ 14,000	$ 10,000
11	NPV	$ 11,071	$ 10,924
12	Choice of project		Project A

Entry in Cell B11 is
=NPV(C2,B6:B10)+B5
Copy the entry in Cell B11 to Cell C11.
Entry in Cell C12 is =IF(B11>C11,B4,C4).

Exercise:

	End of Period Cash Flows			
Year	A	B	C	D
Today	−$1,000	−$1,000	−$1,000	−$1,000
1	$0	$ 0	$350	$200
2	$200	$900	$350	$450
3	$300	$300	$350	$300
4	$900	$200	$350	$450

Using a 10% cost of capital, Present value of the cash inflows, cash outflows and NPV?

A

Year	Cash Flow	Discounted Cash Flow
Today	−$1,000	−$1,000.00
1	$0	$0.00
2	$200	165.29
3	$300	225.39
4	$900	614.71

1005.396

NPV = +$5.396

B

Year	Cash Flow	Discounted Cash Flow
Today	−$1,000	−$1,000.00
1	$ 0	$0
2	$900	743.80
3	$300	225.39
4	$200	136.60

1105.80

NPV = +$105.80

C

Year	Cash Flow	Discounted Cash Flow
Today	−$1,000	−$1,000.00
1	$350	$318.18
2	$350	289.26
3	$350	262.96
4	$350	239.04

1109.45

NPV = +$109.45

D

Year	Cash Flow	Discounted Cash Flow
Today	−$1,000	−$1,000.00
1	$200	$181.82
2	$450	371.90
3	$300	225.39
4	$450	307.36

1086.47

NPV = +$86.47

NPV AND THE PROFITABILITY INDEX

For a project that has an initial cash outflow followed by cash inflows, the profitability index (PI) is simply equal to the present value of cash inflows divided by the initial cash outflow

$$\text{PI} = \frac{\sum_{t=1}^{n} \frac{CF_t}{(1 + r)^t}}{CF_0}$$

When companies evaluate investment opportunities using the PI, the decision rule they follow is to invest in the project when the index is greater than 1.0.
a profitability index greater than 1.0 corresponds to a net present value greater than 0.
The NPV and PI methods will always come to the same conclusion regarding whether a particular investment is worth doing or not.

PROFITABILITY INDEX

$$PI = \frac{\text{PV of Future Cash Flow}}{\text{Initial Cost}}$$

$$NPV_A = -2,000 + \frac{1,000}{(1+10\%)^1} + \frac{800}{(1+10\%)^2} + \frac{600}{(1+10\%)^3} + \frac{200}{(1+10\%)^4} = \$157.64$$

$$PI_A = \frac{2,157.64}{2,000} = 1.0788$$

$$NPV_B = -2,000 + \frac{200}{(1+10\%)^1} + \frac{600}{(1+10\%)^2} + \frac{800}{(1+10\%)^3} + \frac{1,200}{(1+10\%)^4} = \$98.36$$

$$PI_B = \frac{2,098.36}{2,000} = 1.0492$$

the present value of cash inflows for projects A and B, to calculate the PI for each of Bennett's investment options:

PIA = $53,071 : $42,000 = 1.26
PIB = $55,924 : $45,000 = 1.24

According to the profitability index, both projects are acceptable (because PI > 1.0 for both),

which shouldn't be surprising because we already know that both projects have positive NPVs. Furthermore, in this particular case, the NPV rule and the PI both indicate that project A is preferred over project B.

EXERCISE:

Neil Corp. has 3 projects under consideration.
The firm has a cost of capital of 16%

	Project A	Project B	Project C
Initial Investment	$ 40,000	$ 40,000	$ 40,000
Year		Cash Inflows	
1	$13,000	$7,000	$19,000
2	13,000	10,000	16,000
3	13,000	13,000	13,000
4	13,000	16,000	10,000
5	13,000	19,000	7,000

1. Calculate each projects Payback period and determine which one is preferred
2. Calculate each projects NPV and determine which one is preferred
3. Comment on your findings in a and b and recommend the best project.

SOLUTION

Project	Payback Period
A	$40,000/13,000 = 3.08 years
B	3+($10,000/16,000)=3.63 Years
C	2+($5,000/13,000)=2.38 Years

Project C has the shortest payback period

SOLUTION

Project A

PVA = ax PVIFA $_{16\%,5}$

PV_n = \$13,000 x 3.274

PV_n = \$42,562

NPV = \$42,562 - \$40,000 = *\$2,562*

Project B

Year	Cash Inflows	$PVIF_{16\%,n}$	PV
1	7,000	0.862	\$6,034
2	10,000	0.743	7,430
3	13,000	0.641	8,333
4	16,000	0.552	8,832
5	19,000	0.476	9,044
PV			\$39,673

NPV = \$39,673 – 40,000 = *-\$327*

SOLUTION

Project C

Year	Cash Inflows	$PVIF_{16\%,n}$	PV
1	19,000	0.862	$16,378
2	16,000	0.743	11,888
3	13,000	0.641	8,333
4	10,000	0.552	5,520
5	7,000	0.476	3,332
PV			$45,451
NPV = $45,451 – 40,000 = *$5,451*			

Project C is preferred as it has the highest NPV

Project C has high early years cash inflows which leads to the shortest payback period as in addition to its highest NPV so it is the recommended project.

INTERNAL RATE OF RETURN (IRR)

Internal Rate of Return (IRR) “is the discount rate that will equate the present value of the outflows (Initial Investment) with the present value of the inflows.”

The IRR is the project’s intrinsic rate of return.

$$\$0 = \sum_{t=1}^{n} \frac{CF_t}{(1 + IRR)^t} - CF_0$$

$$\sum_{t=1}^{n} \frac{CF_t}{(1 + IRR)^t} = CF_0$$

INTERNAL RATE RETURN

$$NPV = 0 = CF_0 + \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \cdots + \frac{CF_n}{(1+IRR)^n} = \sum_{t=0}^{n} \frac{CF_t}{(1+IRR)^t}$$

$$\text{Project A} \quad 0 = -2,000 + \frac{1,000}{(1+IRR_A)^1} + \frac{800}{(1+IRR_A)^2} + \frac{600}{(1+IRR_A)^3} + \frac{200}{(1+IRR_A)^4}$$

$$\text{Project B} \quad 0 = -2,000 + \frac{200}{(1+IRR_B)^1} + \frac{600}{(1+IRR_B)^2} + \frac{800}{(1+IRR_B)^3} + \frac{1,200}{(1+IRR_B)^4}$$

Multiple Choices:

A. 11.8% **B. 14.5%**

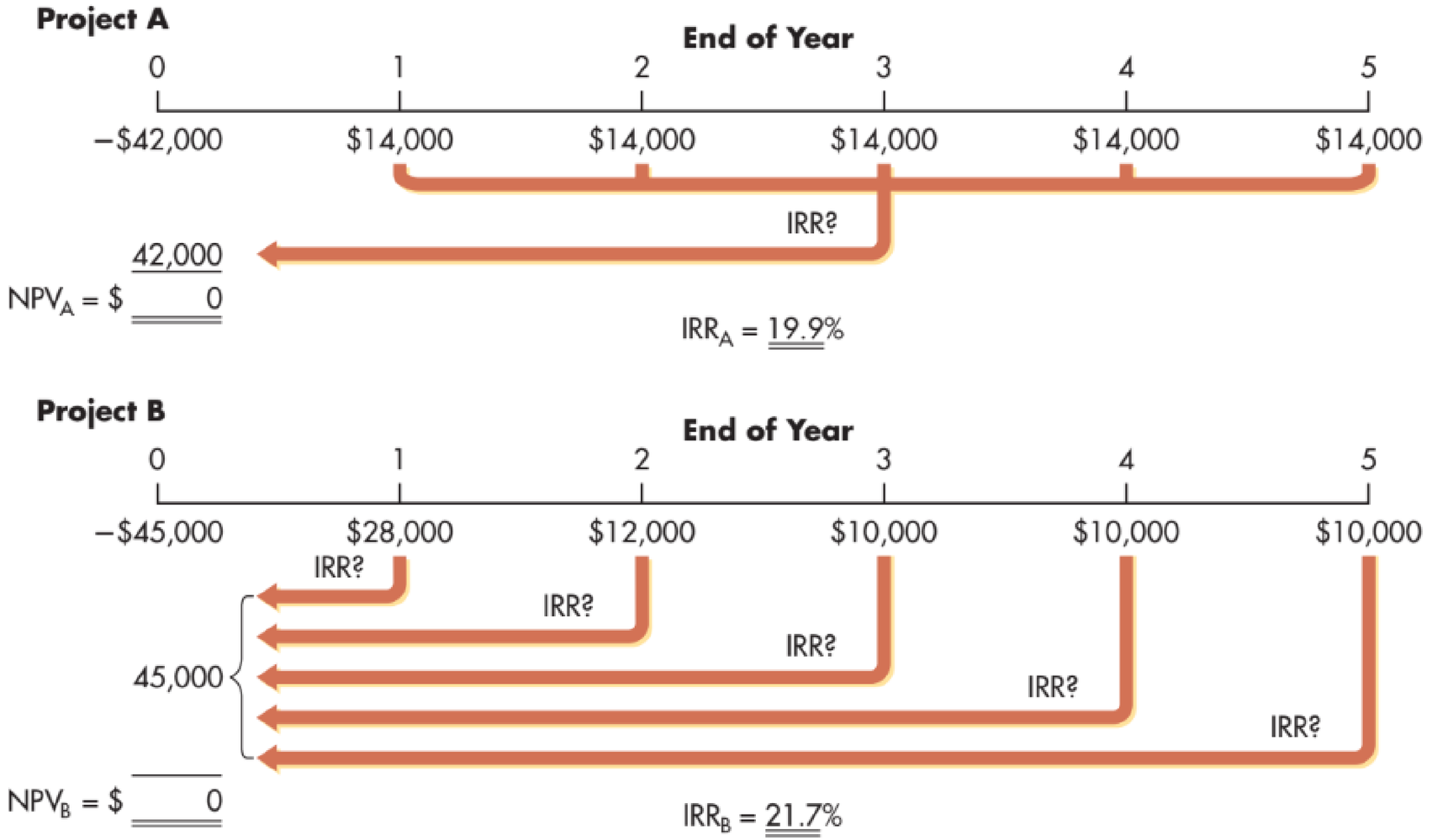
Trial and error gives IRR A = 14.5%

Trial and error gives IRR B = 11.8%

INTERNAL RATE OF RETURN (IRR)

FIGURE 10.3

Calculation of IRRs for Bennett Company's Capital Expenditure Alternatives
Time lines depicting the cash flows and IRR calculations for projects A and B



Spreadsheet use

The IRR can be calculated as shown on the following Excel spreadsheet.

	A	B	C
1	DETERMINING THE INTERNAL RATE OF RETURN		
2		Year-End Cash Flow	
3	Year	Project A	Project B
4	0	$ −42,000	$ −45,000
5	1	$ 14,000	$ 28,000
6	2	$ 14,000	$ 12,000
7	3	$ 14,000	$ 10,000
8	4	$ 14,000	$ 10,000
9	5	$ 14,000	$ 10,000
10	IRR	19.9%	21.7%
11	Choice of project		Project B
	Entry in Cell B10 is =IRR(B4:B9). Copy the entry in Cell B10 to Cell C10. Entry in Cell C11 is =IF(B10>C10,B3,C3).		

Decision Criteria

If IRR > k, accept the project

If IRR < k, reject the project

If IRR = k, technically indifferent

INTERNAL RATE OF RETURN (IRR)-EXERCISE

Bell Manufacturing is choosing between 2 mutually exclusive projects with the following cash inflows. The co's cost of capital is 15%.

	Project X	Project Y
Initial Investment	$500,000	$325,000
Year	Cash Inflows	
1	$100,000	$140,000
2	120,000	120,000
3	150,000	95,000
4	190,000	70,000
5	250,000	50,000

INTERNAL RATE OF RETURN (IRR)

Bell Manufacturing is choosing between 2 mutually exclusive projects with the following cash inflows. The co's cost of capital is 15%.

	Project X	Project Y
Initial Investment	$500,000	$325,000
Year	Cash Inflows	
1	$100,000	$140,000
2	120,000	120,000
3	150,000	95,000
4	190,000	70,000
5	250,000	50,000

- Calculate the IRR for each project
- Assess the acceptability of each project on the basis of IRR
- Which project is preferred?

INTERNAL RATE OF RETURN (IRR)

	Project X	Project Y
0	-500000	-325000
1	100,000	140000
2	120,000	120000
3	150,000	95000
4	190,000	70000
5	250,000	50000
IRR	**16%**	**17%**

a.Both projects X and Y are accepted since their IRR's are higher than the cost of capital (15%)
b.Project Y is preferred bec. It has a higher IRR.

INTERNAL RATE OF RETURN (IRR)-EXERCISE

Nicholson Inc. is considering two mutually exclusive projects each with an initial investment of $150,000. The maximum acceptable payback period is 4 years, the cost of capital is 9%.

1. Calculate the payback period for each project
2. Calculate the NPV for each project at 0% and 9%
3. Calculate the IRR for each project
4. Rank the projects by each of the techniques used and make a recommendation.

	Cash Inflows	
	Project A	Project B
1	$45,000	$75,000
2	45,000	60,000
3	45,000	30,000
4	45,000	30,000
5	45,000	30,000
6	45,000	30,000

INTERNAL RATE OF RETURN (IRR)

a. $150,000/$45000 = 3.33 years

b. $ 150,000 –($75,000-60,000)= $15000/30000 = 0.5= 2.5 years.

	Project A	NPV @0%		NPV @ 9%
0	(150,000)			
1	45,000	45,000	0.917	41,265
2	45,000	45,000	0.842	37,890
3	45,000	45,000	0.772	34,740
4	45,000	45,000	0.708	31,860
5	45,000	45,000	0.650	29,250
6	45,000	45,000	0.596	26,820
		270,000		**201,825**
NPV		***120,000***		***51,825***

INTERNAL RATE OF RETURN (IRR)

	Project B	NPV @0%		NPV @ 9%
0	(150,000)			
1	75,000	75,000	0.917	68,775
2	60,000	60,000	0.842	50,520
3	30,000	30,000	0.772	23,160
4	30,000	30,000	0.708	21,240
5	30,000	30,000	0.650	19,500
6	30,000	30,000	0.596	17,880
		255,000		**201,075**
NPV		***105,000***		***51,075***

	Project A	Project B
0	(150,000)	(150,000)
1	45,000	75,000
2	45,000	60,000
3	45,000	30,000
4	45,000	30,000
5	45,000	30,000
6	45,000	30,000
IRR	***20%***	***23%***

INTERNAL RATE OF RETURN (IRR)-EXERCISE

		Rank	
	Payback	NPV	IRR
Project			
A	2	1	2
B	1	2	1

The project that should be selected is A. The conflict between NPV and IRR is due partially to the reinvestment rate assumption. The assumed reinvestment rate of project B is 22.71%, the project's IRR. The reinvestment rate assumption of A is 9%, the firm's cost of capital. On a practical level project B will probably be selected due to management's preference for making decisions based on percentage returns.

INTERNAL RATE OF RETURN (IRR)

Projects A & B of equal risk opportunities. The firm's cost of capital is 13% given the following cash flows.

	Project A	Project B
Initial Investment	$80,000	$50,000
Year	Cash Inflows	
1	$15,000	$15,000
2	20,000	15,000
3	25,000	15,000
4	30,000	15,000
5	35,000	15,000

INTERNAL RATE OF RETURN (IRR)

a.Calculate each projects payback period
b.Calculate the NPV for each project
c.Calculate the IRR for each project

Payback (project A)
= $80,000-$15,000-$20,000-$25,000
=$20,000/$30,000 = 0.66
=3+0.66 = 3.66 Years

Payback (Project B)
= $50,000/$15,000 = 3.33 Years

INTERNAL RATE OF RETURN (IRR)

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b.Calculate the NPV for each project
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Payback (project A)
= $80,000-$15,000-$20,000-$25,000
=$20,000/$30,000 = 0.66
=3+0.66 = 3.66 Years

Payback (Project B)
= $50,000/$15,000 = 3.33 Years

	Project A	PVIF $_{13\%}$	NPV @ 13%	Project B	PVIFA $_{13\%,5}$	NPV @ 9%
0	(80,000)			(50,000)		
1	15,000	0.885	13,275	15,000		
2	20,000	0.783	15,660	15,000		
3	25,000	0.693	17,325	15,000	3.517	
4	30,000	0.613	18,390	15,000		
5	35,000	0.543	19,005	15,000		
			83,655			52,755
NPV			*$ 3,655*			*$ 2,755*
IRR	*14.61%*			*15.24%*		

Both projects are acceptable. Both have positive NPVs and equivalent IRR's that are greater than the cost of capital. Although Project B has a slightly higher IRR, the rates are very close. Since Project A has a higher NPV, and also has the shortest payback, accept Project A.

Comparing NPV and IRR Techniques

Net Present Value Profiles: Graph that depicts a project's NPVs for various discount rates.

TABLE 10.4 Discount Rate–NPV Coordinates for Projects A and B

	Net present value	
Discount rate	Project A	Project B
0%	$28,000	$25,000
10	11,071	10,924
19.9	0	—
21.7	—	0

Comparing NPV and IRR Techniques

discount rate of 0%

For project A:
($14,000 + $14,000 + $14,000 + $14,000 + $14,000) - $42,000 = $28,000
For project B:
($28,000 + $12,000 + $10,000 + $10,000 + $10,000) - $45,000 = $25,000

Comparing NPV and IRR Techniques

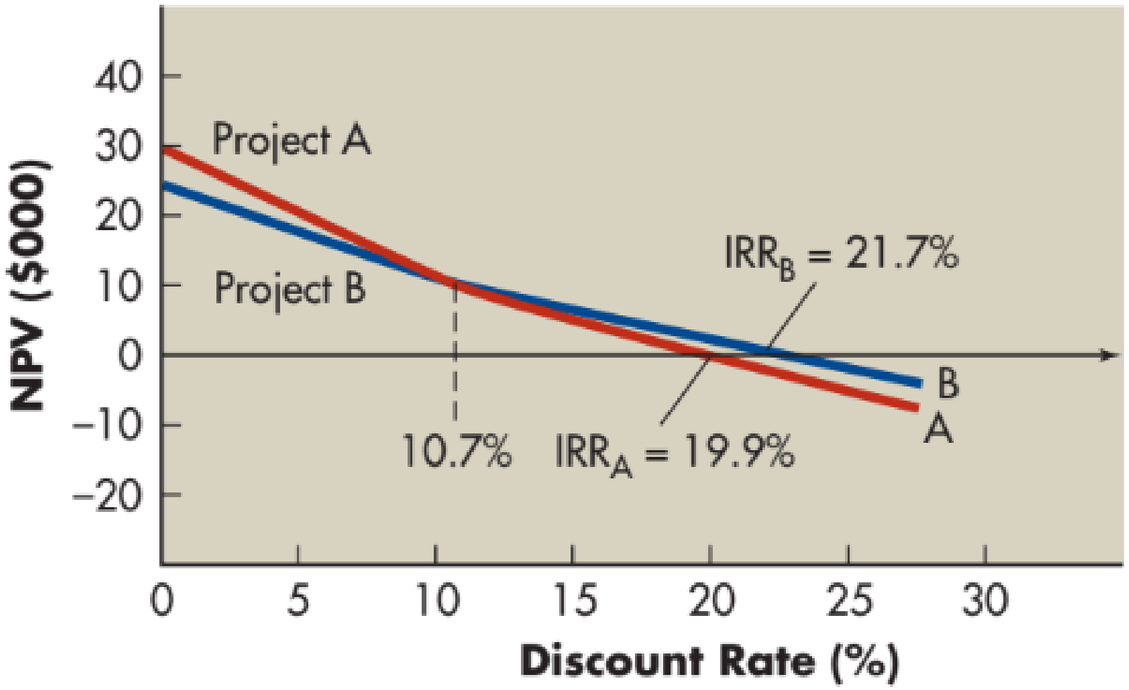
The net present values for projects A and B at the 10% cost of capital are **$11,071** and **$10,924 (Figure 10.2)**.

The IRR is the discount rate for which net present value equals zero, the IRRs (from Figure 10.3) of 19.9% for project A and 21.7% for project B result in $0 NPVs.

Comparing NPV and IRR Techniques

FIGURE 10.4

NPV Profiles
Net present value profiles for Bennett Company's projects A and B



The mportant facts:

- The IRR of project B is greater than the IRR of project A,
- managers using the IRR method to rank projects will always choose B over A if both projects are acceptable.
- The NPV of project A is sometimes higher and sometimes lower than the NPV
- of project B;
- the NPV method will not consistently rank A above B or vice versa. The NPV ranking will depend on the firm's cost of capital.
- When the cost of capital is approximately 10.7%, projects A and B have iden- tical NPVs.

Conflicting Rankings

- Conflicting rankings between two or more projects using NPV and IRR sometimes occurs because of differences in the timing and magnitude of cash flows.
- This underlying cause of conflicting rankings is the implicit assumption concerning the reinvestment of intermediate cash inflows—cash inflows received prior to the termination of the project.
- NPV assumes intermediate cash flows are reinvested at the cost of capital, while IRR assumes that they are reinvested at the IRR.

DECISION

Capital Budgeting	PROJECT A	PROJECT B
Payback Period	2.33 years	3.33 years
Disc. Payback Period	2.95 years	3.88 years
NPV	$157.64	$98.36
IRR	14.5%	11.8%
PI	1.08	1.05

Kesimpulan: pilih project A daripada project B

Capital Budgeting Cash Flow

THE INITIAL INVESTMENT

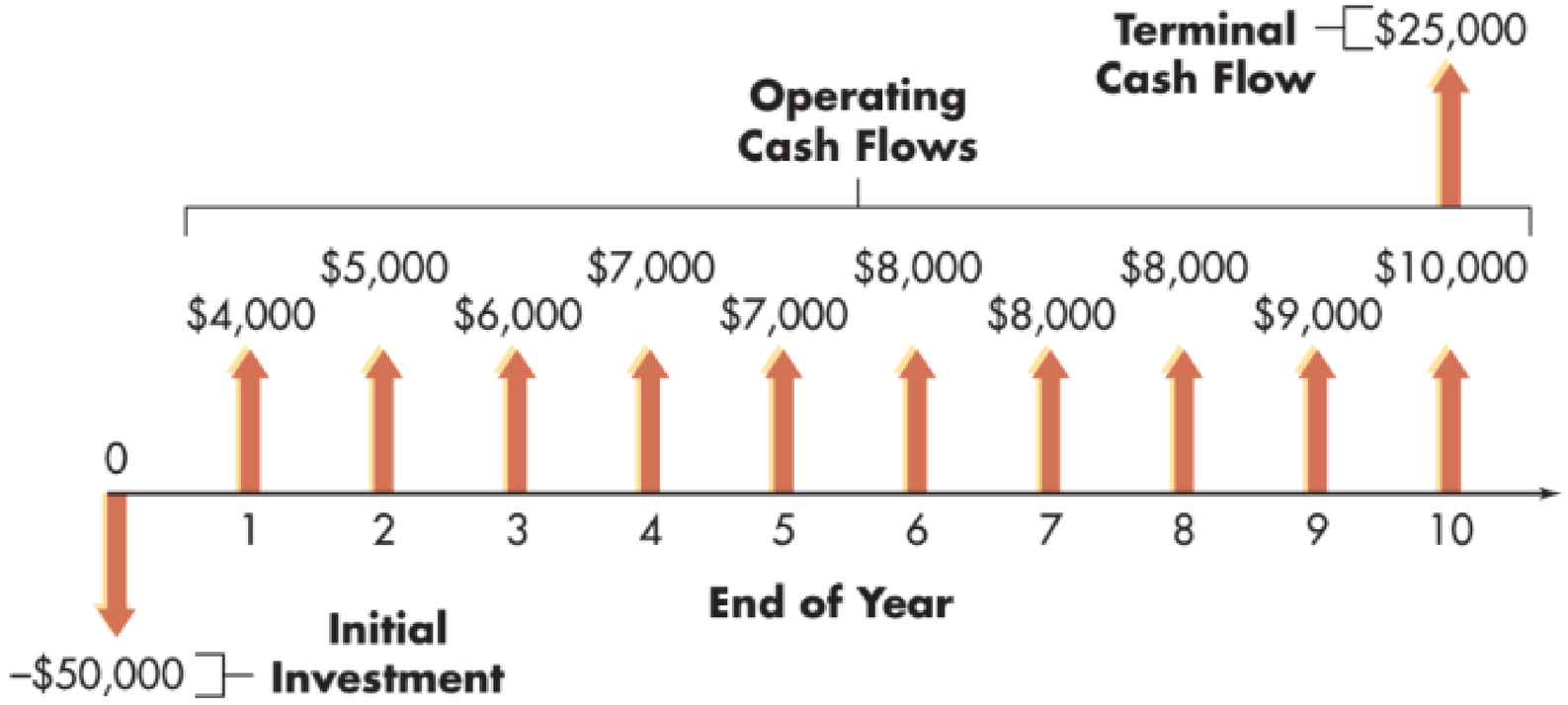
ESTIMATED FUTURE ANNUAL CASH FLOWS

FORECAST OF NET CASH FLOWS

SALVAGE OR TERMINAL VALUE

FIGURE 11.1

Cash Flow Components
Time line for major cash flow components



The cash flows of any project may include three basic components:
(1) an initial investment,
(2) operating cash flows (inflows or outflows), and
(3) terminal cash flow.

Estimating Project Cash Flows

RELEVANT CASH FLOWS

Relevant cash flows are incremental cash flows (inflows and outflows) that would not occur if not for the investment being evaluated.

THE INITIAL INVESTMENT

the initial acquisition cost of an asset .the relevant cash outflow at time zero.

ESTIMATED FUTURE ANNUAL CASH FLOWS

The expected incremental future annual cash inflows and outflows resulting from the investment.

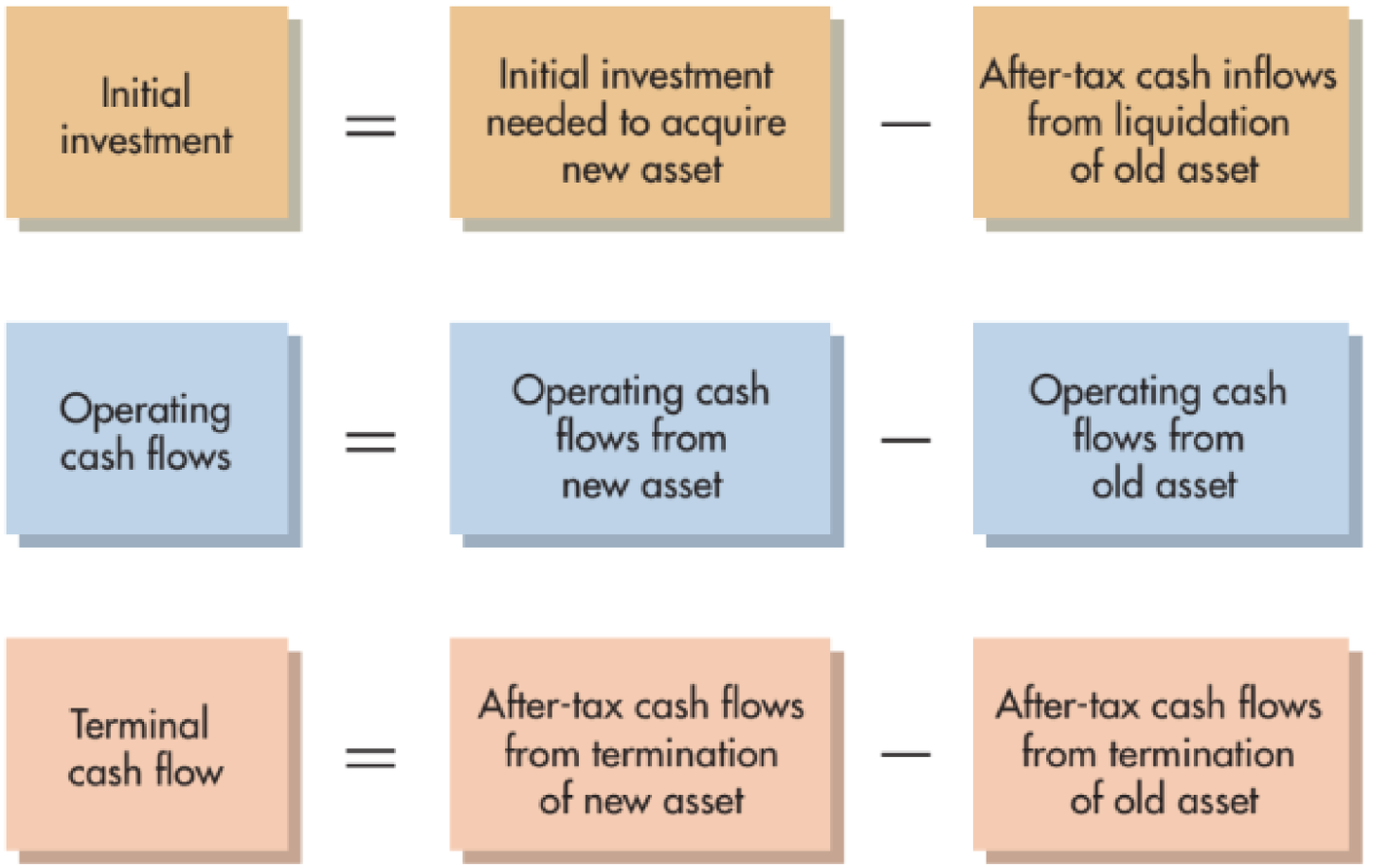
The net incremental after-tax cash inflows and outflows resulting from implementation of the project during its life,

SALVAGE VALUE

the expected terminal value of the investment.The terminal value represents a cash inflow at the end of the last year of the forecast period, and can be expressed as a specific amount or as a percentage of the original cost (liquidation of the project).

FIGURE 11.2

Relevant Cash Flows for Replacement Decisions
Calculation of the three components of relevant cash flows for a replacement decision



THE INITIAL INVESTMENT

the initial acquisition cost of an asset (includes: delivery, installation, testing, and training costs), land and building, (includes :costs for zoning changes,permits, and other issues related to land use regulations,architectural and engineering fees, the services of consultants for layout office and production area)legal fees to prepare, preliminary market studies, and preliminary engineering and cost studies, property appraisals, various types of engineering services, negotiate purchase contracts.

Description	Expected Costs
Acquisition cost	$500,000
Delivery	25,000
Insurance during delivery	1,000
Installation, testing, and calibration	2,500
Materials used during installation, testing, and calibration	1,250
Working capital	10,000
Total initial investment	$539,750

Source:Baker & English (2011)

TABLE 11.1 The Basic Format for Determining Initial Investment

(1) Installed cost of new asset =
Cost of new asset
+ installation costs

(2) After-tax proceeds from sale of old asset =
Proceeds from sale of old asset
∓ Tax on sale of old asset

(3) Change in net working capital

Initial Investment Cash Flow = (1) − (2) +/− (3)

Installed cost of proposed machine		
Cost of proposed machine	$380,000	
+ Installation costs	20,000	
Total installed cost—proposed (depreciable value)		$400,000
– After-tax proceeds from sale of present machine		
Proceeds from sale of present machine	$280,000	
–Tax on sale of present machine	84,160	
Total after-tax proceeds		195,840
+ Change in net working capital		17,000
Initial investment		221,160

ESTIMATED FUTURE ANNUAL CASH FLOWS

are the cash inflows and outflows that are expected to occur as a result of the company making the proposed investment.

- Marketing Input , consist of of cost estimates related to the promotion, distribution, and market research associated with a proposed product.gain from market studies, focus groups expert,indept-interview expert or practitoiners or industry publications.
- Operations Input, representatives from operations (production)
- Input from Other Departments:Human resources personnel etc

SALVAGE OR TERMINAL VALUE

The estimated terminal value for an asset used in the production process comes from the person most familiar with the market for used equipment or independent sources, such as used equipment brokers, trade publications.

- Productive assets
- Land and buildings

TABLE 11.6 Calculation of Operating Cash Flows Using the Income Statement Format

Revenue
− Expenses (excluding depreciation and interest)
Earnings before depreciation, interest, and taxes (EBDIT)
− Depreciation
Earnings before interest and taxes (EBIT)
− Taxes (rate = T)
Net operating profit after taxes [NOPAT = EBIT $\times(1 - T)$]
+ Depreciation
Operating cash flows (OCF) (same as OCF in Equation 4.3)

TABLE 11.9 The Basic Format for Determining Terminal Cash Flow

	After-tax proceeds from sale of new asset =
	Proceeds from sale of new asset
	± Tax on sale of new asset
−	**After-tax proceeds from sale of old asset =**
	Proceeds from sale of old asset
	∓ Tax on sale of old asset
±	**Change in net working capital**
	Terminal cash flow

TABLE 11.7 Calculation of Operating Cash Flows for Powell Corporation's Proposed and Present Machines

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
With proposed machine						
Revenue[a]	$2,520,000	$2,520,000	$2,520,000	$2,520,000	$2,520,000	$ 0
− Expenses (excluding depreciation and interest)[b]	2,300,000	2,300,000	2,300,000	2,300,000	2,300,000	0
Earnings before depreciation, interest, and taxes	$ 220,000	$ 220,000	$ 220,000	$ 220,000	$ 220,000	$ 0
− Depreciation[c]	80,000	128,000	76,000	48,000	48,000	20,000
Earnings before interest and taxes	$ 140,000	$ 92,000	$ 144,000	$ 172,000	$ 172,000	−$20,000
− Taxes (rate, $T = 40\%$)	56,000	36,800	57,600	68,800	68,800	− 8,000
Net operating profit after taxes	$ 84,000	$ 55,200	$ 86,400	$ 103,200	$ 103,200	−$12,000
+ Depreciation[c]	80,000	128,000	76,000	48,000	48,000	20,000
Operating cash flows	$ 164,000	$ 183,200	$ 162,400	$ 151,200	$ 151,200	$ 8,000
With present machine						
Revenue[a]	$2,200,000	$2,300,000	$2,400,000	$2,400,000	$2,250,000	$ 0
− Expenses (excluding depreciation and interest)[b]	1,990,000	2,110,000	2,230,000	2,250,000	2,120,000	0
Earnings before depreciation, interest, and taxes	$ 210,000	$ 190,000	$ 170,000	$ 150,000	$ 130,000	$ 0
− Depreciation[c]	28,800	28,800	12,000	0	0	0
Earnings before interest and taxes	$ 181,200	$ 161,200	$ 158,000	$ 150,000	$ 130,000	$ 0
− Taxes (rate, $T = 40\%$)	72,480	64,480	63,200	60,000	52,000	0
Net operating profit after taxes	$ 108,720	$ 96,720	$ 94,800	$ 90,000	$ 78,000	$ 0
+ Depreciation[c]	28,800	28,800	12,000	0	0	0
Operating cash flows	$ 137,520	$ 125,520	$ 106,800	$ 90,000	$ 78,000	$ 0

A&CO COMPANY FORECAST OF CASH INFLOWS FROM OPERATING ACTIVITIES

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Estimated unit sales	5,000	55,000	90,000	100,000	10,000	260,000
Selling price per unit	$15.00	$15.00	$15.50	$15.50	$15.50	
Estimated cash inflows	$75,000	$825,000	$1,395,000	$1,550,000	$155,000	$4,000,000

A&CO COMPANY FORECAST OF CASH OUTFLOWS FROM OPERATING AND MARKETING ACTIVITIES

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Estimated unit sales	5,000	55,000	90,000	100,000	10,000	260,000
Manufacturing costs						
Variable cost per unit	$11.00	$11.00	$11.25	$11.25	$11.25	
Total variable cost	$55,000	$605,000	$1,012,500	$1,125,000	$112,500	$2,910,000
Total fixed costs	$15,000	$15,000	$15,000	$15,000	$15,000	$75,000
Marketing costs						
Total variable costs	$1,125	$12,375	$20,925	$23,250	$2,325	$60,000
Total fixed costs	$7,500	$7,500	$7,500	$7,500	$0	$30,000

A&CO COMPANY CASHFLOW PROJECTIONS

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Panel A. Undiscounted Cash Flows							
Initial investment	$(539,750)						$(539,750)
Cash flows from operating activities							
Cash inflows from sales		$75,000	$825,000	$1,395,000	$1,550,000	$155,000	$4,000,000
Cash outflows							
Manufacturing costs							
Variable		(55,000)	(605,000)	(1,012,500)	(1,125,000)	(112,500)	(2,910,000)
Fixed		(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	(75,000)
Marketing costs							
Variable		(1,125)	(12,375)	(20,925)	(23,250)	(2,325)	(60,000)
Fixed		(7,500)	(7,500)	(7,500)	(7,500)	0	(30,000)
Overhaul year 3				(50,000)			(50,000)
Terminal value						25,000	25,000
Net cash flows	$(539,750)	$(3,625)	$185,125	$289,075	$379,250	$50,125	$360,250