

**COURSE: BFB3013 FINANCIAL MANAGEMENT  
FACULTY: BUSINESS ADMINISTRATION**

**COURSENOTES:**

# **TOPIC 1 Cash Flow Estimation**

**COURSE TITLE: FINANCIAL MANAGEMENT**

**COURSE CODE: BFB3013**

**PREPARED BY: ASSOC. PROF. MOHD KHIR ASHARI**

## **Topic 1 Cash Flows Estimation**

### **1.0 Introduction:**

**1.1 Capital budgeting** is the decision-making process used in the acquisition of long-term physical assets. Capital budgeting decisions are crucial to a firm's long-term financial health because successful capital budgeting projects usually generate a positive cash flow for a long period of time while unsuccessful capital budgeting projects do not return sufficient cash flow to justify the investment. Such projects usually continue to generate losses or are liquidated for a large one-time loss.

Cash flow estimation is a must for assessing the investment decisions in capital budgeting. To be consistent with wealth maximization principle, an evaluation of a project must be based on cash flows and not on accounting profits. This cash flow forecasting are some of the most difficult steps involved in the capital budgeting. Projects have failed or succeeded due to incorrect or correct estimates of the cash flows of the project. If cash flow estimates are incorrect, it doesn't matter which technique we use, the project is doomed to fail.

### **1.2 Learning Objectives:**

After reading this chapter, students should be able to:

- LO1 Explain the basic principles of cash flow estimation
- LO2 Illustrate an expansion project and make a decision whether the project should be accepted on the basis of standard capital budgeting techniques.
- LO3 Explain the terms: incremental cash flow, net operating working capital, sunk cost, opportunity cost, and externalities.

## **1.2 KEY CONTENTS**

### **1.2.1 LO1 Explain the Principles of Cash Flow Estimation**

To be able to use NPV technique or any other technique of capital budgeting analysis successfully and accurately, we must have

- a. an unbiased estimate of the expected future cash flows of the project
- b. including time to completion and estimate initial investment/cost

To evaluate investment decisions there are some principles of cash flow estimation which must be adhered to:

- a. Only cash can be spent or reinvested, and since accounting profits do not represent cash, they are of less fundamental importance than cash flows for investment analysis – ‘CASH IS KING’
- b. Capital budgeting analysis should only include those cash flows that will be affected by the decision. Sunk costs are unrecoverable and cannot be changed, so they have no bearing on the capital budgeting decision. Opportunity costs represent the cash flows the firm gives up by investing in this project rather than its next best alternative, and externalities are the cash flows (both positive and negative) to other projects that result from the firm taking on this project. These cash flows occur only because the firm took on the capital budgeting project; therefore, they must be included in the analysis
- c. When a firm takes on a new capital budgeting project, it typically must increase its investment in receivables and inventories, over and above the increase in payables and accruals, thus increasing its net operating working capital (NOWC). Since this increase must be financed, it is included as an outflow in Year 0 of the analysis. At the end of the project's life, inventories are depleted and receivables are collected. Thus, there is a decrease in NOWC, which is treated as an inflow in the final year of the project's life.
- d. The costs associated with financing are reflected in the weighted average cost of capital. To include interest expense in the capital budgeting analysis would “double count” the cost of debt financing.
- e. Daily cash flows would be theoretically best, but they would be costly to estimate and probably no more accurate than annual estimates because we simply cannot forecast accurately at a daily level. Therefore, in most cases we simply assume that all cash flows occur at the end of the year. However, for some projects it might be useful to assume that cash flows occur at mid-year, or even quarterly or monthly. There is no clear upward or downward bias on NPV since both

revenues and costs are being recognized at the end of the year. Unless revenues and costs are distributed radically different throughout the year, there should be no bias.

The project cash flows consider almost every kind of inflows of cash. Because of this the capital budgeting is done through the co-ordination of a wide range of professionals who are going to be involved in the project.

**1.2.2 LO2 Illustrate an expansion project and make a decision whether the project should be accepted on the basis of standard capital budgeting techniques.**

The capital budgeting decision is essentially based upon a Cost - Benefit Analysis. The cost of a project is called the **Net Investment**. The benefits from a project are the future cash flows generated. We call these the **Net Cash Flows**.

A. **The Net Investment** (sometime called initial investments) is the net cash outflows required to ready a project for its basic operation. The net investment includes:

1. **Cost of any assets**
2. **+ Any incidental costs to put the asset to use example delivery costs and installation costs**
3. **+ Any required increase in net working capital**
4. **- After-tax salvage value from replaced assets (or disposal of existing assets)**

B. **The Net Cash Flows** are the future cash flows generated from a project once it commences operation. The net cash flows are expected to continue throughout the project's economic life.

The basic net cash flow for each year is:

1. **Sales revenue**
2. **- (Less) Operating expenses\***
3. **- (Less) Depreciation**
4. **= Earnings before taxes x (1 - tax rate)**
5. **- (Less) Taxes**
6. **= Earnings After taxes**
7. **+ (Add) Depreciation\*\***

**8. (And for Terminal Year only)<sup>\*\*\*</sup> + (Add) Terminal Year Non-Operating Cash Flow**

**9. = Cash Inflows**

\* **Interest expense** is generally not included in the net cash flows since it will be taken into account later through the firm's required rate of return.

\*\* **Depreciation** shelters income from taxes. Thus, greater depreciation reduces taxes. Depreciation is not an out-of-pocket expense. Thus an increase in depreciation will reduce profit but increase cash flow.

\*\*\* **Terminal Non-operating Cash Flow.** These are special one-time cash flows that only occur at the end of a project's life. They are added to a project's last net cash flow. They include:

1. After-tax salvage value of the project's assets
  - Taxes owed on salvage value depend upon the salvage price relative to the asset's book value.
  - As asset's book value is the asset's original acquisition cost minus all depreciation taken on the asset (accumulated depreciation).
  - If an asset is sold for its book value then no taxes are owed.
  - If an asset is sold for more than book value, then taxes are owed on this excess.
  - If an asset is sold for less than book value, then taxes are reduced. The loss acts as a tax shelter, reducing taxes by an amount equal to the firm's marginal tax rate times the deficit.
2. Return of any increased net working capital

**Illustration:**

You have been asked by the president of your company to evaluate the proposed acquisition of new equipment. The equipment's basic price is RM193000, and shipping costs will be RM7700. It will cost another RM23200 to modify it for special use by your firm and an additional RM13500 to install the equipment. The equipment falls in the MACRS 3-year class, and it will be sold after 3 years for RM30900. The equipment is expected to generate revenue of RM178000 per year with annual operating costs (excluding depreciation) of RM84000. The firm's tax rate is 28% and its cost of capital is 10%.

**REQUIRED:**

- i. What is the firm's initial investment of the machine and
- ii. What is the operating cash flow form Year 1 - 3?
- iii. Should the company invest in this new equipment?

*Note: Under the MACRS 3-year class, depreciation is 33% in first year, 45% in second year, 15% in third year and 7% in fourth year.*

<b>Initial Investment (Cash Outflow)</b>	
<b>Y<sub>0</sub></b>	<b>RM</b>
Price of Equipment	193000
ADD:	
Shipping costs	7700
Modification costs	23200
Installation	13500
<b>Initial Outlay</b>	<b>237400</b>

<b>Yearly Cash Inflow</b>	<b>Y1</b>	<b>Y2</b>	<b>Y3</b>	<b>Total</b>
Revenue	178000	178000	178000	
Operating Expenses	(84000)	(84000)	(84000)	
Depreciation	(78342)	(106830)	(35610)	
<b>Net Profit Before Tax</b>	<b>15658</b>	<b>(12830)</b>	<b>58390</b>	
(Tax Payable) / Tax Saving – 28%	(4384.24)	3592.40	(16349.20)	
<b>Profit After Tax</b>	<b>11273.76</b>	<b>(9237.60)</b>	<b>42040.80</b>	
Add: Depreciation	78342	106830	35610	
<b>Cash Inflow</b>	<b>89615.76</b>	<b>97592.40</b>	<b>77650.80</b>	
PV Factor, Lump Sum, 10%	0.9091	0.8264	0.7513	
<b>PV of Inflow</b>	<b>81469.69</b>	<b>80650.36</b>	<b>58339.05</b>	<b>220459.09</b>

	<b>RM</b>	<b>Terminal Year Cash Flow Y3</b>
Cost Of Equipment	237400	
Less: Accumulated Depreciation	(220782)	
<b>Book Value</b>	<b>16618</b>	
Disposal Price	(30900)	30900
<b>Gain on Disposal</b>	<b>14282</b>	
Tax on Gain – 28%	(4000)	(4000)
<b>Net Gain</b>	<b>10282</b>	
<b>After Tax Salvage Value</b>		<b>26900</b>
PV Factor, Lump Sum, 10%		0.7513
<b>Present Value</b>		<b>20201</b>

<b>Net Present Value</b>	<b>RM</b>
<b>Initial Outlay</b>	<b>(237400)</b>
<b>Σ Present Value of Future Cash Inflows</b>	<b>220459.09</b>
<b>Present Value Terminal Cash Flow Y3</b>	<b>20201</b>
<b>NPV</b>	<b>3260.09</b>
<b>Decision –invest in the new equipment since the NPV is positive.</b>	

1.2.3 LO3 Explain the terms: incremental cash flow, net operating working capital, sunk cost,

## opportunity cost and externalities.

### 1. Incremental cash flow

The only cash flow that matters from the perspective of capital budgeting decision is incremental cash flow. It is the difference between the firm's cash flows with and without a project.

Incremental cash flows is the additional operating cash flow that an organization receives from taking on a new project. A positive incremental cash flow means that the company's cash flow will increase with the acceptance of the project.

There are several components that must be identified when looking at incremental cash flows: the initial outlay, cash flows from taking on the project, terminal cost or value and the scale and timing of the project. A positive incremental cash flow is a good indication that an organization should spend some time and money investing in the project.

For example, if the management team is reviewing a proposal to improve the capacity of a machine, the entire cash flow resulting from the use of that machine is not the point upon which the decision must be made, but rather the incremental cost of improving the machine, and the incremental revenue that results from having additional capacity. For example, let us assume that a machine produces 1,000 cans per hour, and an upgrade to the machinery will result in an increase in the theoretical capacity to 1,500 cans per hour, for an incremental change of 500 cans per hour. The cost of the upgrade is RM100,000, and the profit from each can is RM.04. Since the machine runs 8 hours a day for five days per week, the increase in capacity will result in an added cash inflow of RM41,600, which is calculated as follows:

$$\begin{aligned} & (500 \text{ cans per hour}) \times \text{RM}.04 = \text{RM}20 \text{ per hour incremental cash inflow} \\ & = (\text{RM}20 \text{ per hour of cash inflow}) \times (40 \text{ hours per week}) \times (52 \text{ weeks per year}) \\ & = \text{RM}41,600 \end{aligned}$$

### 2. Net Operating Working Capital

Net working capital

- Is current asset less current liabilities.
- Is affected by decision to accept capital projects for expansion
  
- Current assets that will likely increase: additional inventories and accounts receivable
- Current liabilities that will likely increase: accounts receivable and accruals

If increase in current assets is greater than current liabilities, funding *in addition to* the capital project will be needed. It is additional cash outflows for accepting the project.

### 3. Sunk costs

It is a cost that has already occurred, regardless of whether the decision to accept a project will be made for example, spending on ADVERTISING or researching a product idea . Sunk Cost is not incremental cash flows. Sunk Costs have to be ignored in capital budgeting decision i.e. it should not normally be taken into account when determining whether to continue a project or abandon it, because they cannot be recovered either way.

#### **4. Opportunity Costs**

The cost of passing up the next best choice when making a decision. For example, if an asset such as capital is used for one purpose, the opportunity cost is the value of the next best purpose the asset could have been used for. Opportunity cost analysis is an important part of a company's decision-making processes. Opportunity costs have to be considered as negative (incremental) cash flows and subtracted from the NPV of the project.

#### **5. Externalities**

Externalities (or sometime called cannibalization) are effect of a project on Cash Flows in other parts of the firm. Externalities are often very difficult to quantify, but they should be considered and must be included in the estimate of the operating cash flow.

Examples: If the new product line decreases the sales of the firm's other lines, would this affect the analysis? YES. The effect on other projects' Cash Flows is an "externality." Net Cash Flows loss per year on other lines would be a cost to this project.

If the facility could be leased out for RM25,000 per year, would this affect the analysis? YES, by accepting the project, the firm foregoes a possible annual cash flow of RM25,000, which is an opportunity cost to be charged to the project.

The relevant cash flow is the annual after-tax opportunity cost.

$$\begin{aligned} \text{A-T opportunity cost} &= \text{RM}25,000 (1 - \text{Tax Rate}) \\ &= \text{RM}25,000(1-27\%) \\ &= \text{RM}18,250 \end{aligned}$$

Externalities can be positive (in the case of complements) or negative (substitutes).

### **1.3 TUTORIAL ACTIVITIES**

#### **Question 1**

MultiAlpha is considering replacing an old machine with a new one. Two months ago their chief engineer completed a training workshop on the new machine's operation and efficiency. The cost of RM4000 cost for this workshop session has already been paid. If the new machine is purchased, it would require RM5000 in installation and modification costs to make it suitable for operation in the factory.

The old machine originally cost RM90000 five years ago and is being depreciated by RM15000 per year. The new machine will cost RM80000 before installation and modification. It will be depreciated by RM5000 per year. The old machine can be sold today for RM10000. The marginal tax rate for the firm is 28%.

Compute the relevant initial outlay in this capital budgeting decision.

<b>Initial Investment (Cash Outflow)</b>		Remark
<b>Y<sub>0</sub></b>	<b>RM</b>	
Price of Equipment	80000	
ADD:		
Cost of Training	0	Sunk costs
Shipping costs	0	
Modification costs	0	
Installation	5000	
<b>Initial Outlay</b>	<b>85000</b>	
Less:		
Cash Inflow Upon Sale of Existing Machine	(10000)	
Tax Saving on Disposal of Existing Machine	(1400)	
<b>Net Cash Flow for Investment</b>	<b>73600</b>	

<b>Sale of Existing Machine</b>	<b>RM</b>	<b>Cash Flow Upon Disposal Of Existing Machine</b>
Cost Of Equipment	90000	
Less: Accumulated Depreciation RM15000 x 5 years	(75000)	
<b>Book Value</b>	<b>15000</b>	
Disposal Price	10000	10000
<b>Loss on Disposal</b>	<b>5000</b>	
Tax Saving – 28%	1400	1400

**Question 2**

Canggih Sdn. Bhd. is considering a new product. The company currently manufactures several lines of school uniform. The new product, Canggih Jean, is expected to generate sales of RM1.0 million per year for the next 5 years. They expected that during this five-year period, they will lose about RM250000 in sales of existing line of jean. The new line will require no additional equipment or space in the plant and can be produced in the same manner as the apparel products. The new project will, however, require that the company spend an additional RM80000 per year on insurance for raw materials. Also an additional marketing manager would be hired to oversee the line at a salary of RM45000 per year in salary and benefits, in addition to the current manager who is earning RM60000 per year in salary and benefits. Depreciation of RM100000 of existing plant and machinery is expected to remain the same.

If the marginal tax rate is 28%, compute the incremental after tax cash flow for years 1-5.

<b>Yearly Cash Inflow</b>	<b>Y1</b>	<b>Y2</b>	<b>Y3</b>	<b>Y4</b>	<b>Y5</b>
Revenue	1000000	1000000	1000000	1000000	1000000
Operating Expenses:					
Additional Insurance	(80000)	(80000)	(80000)	(80000)	(80000)
New Marketing Manager	(45000)	(45000)	(45000)	(45000)	(45000)
Lost in Current Sale (Opportunity Costs)	(250000)	(250000)	(250000)	(250000)	(250000)
Depreciation (non-relevant costs)	-	-	-	-	-
<b>Net Profit Before Tax</b>	<b>625000</b>	<b>625000</b>	<b>625000</b>	<b>625000</b>	<b>625000</b>
(Tax Payable) / Tax Saving – 28%	(175000)	(175000)	(175000)	(175000)	(175000)
<b>Profit After Tax</b>	<b>450000</b>	<b>450000</b>	<b>450000</b>	<b>450000</b>	<b>450000</b>
Add: Depreciation	-	-	-	-	-
<b>Net Cash Flow</b>	<b>450000</b>	<b>450000</b>	<b>450000</b>	<b>450000</b>	<b>450000</b>

Question 3

**3. Cash Estimation**

(a) Rupab Sdn. Bhd has in issue five million shares with a market value of RM3.81 per share. The equity beta of the company is 1.2. The yield on short-term government debt is 4.5% per year and the equity risk premium is approximately 5% per year.

The debt finance of Rupab Sdn. Bhd consists of bonds with a total book value of RM2 million. These bonds pay annual interest before tax of 7%. The par value and market value of each bond is RM100.

Rupab Sdn. Bhd pays taxation one year in arrears at an annual rate of 25%. Capital allowances (tax-allowable depreciation) on machinery are on a straight-line basis over the life of the asset.

**REQUIRED: Calculate the after-tax weighted average cost of capital of RupabSdn Bhd.**

**3 (a) Calculation of weighted average cost of capital**

$$\text{Cost of Equity : } k_e = k_{rf} + (k_m - k_{rf})\beta$$

$$\text{Cost of equity} = 4.5 + (1.2 \times 5) = 10.5\%$$

The company's bonds are trading at par and therefore the before-tax cost of debt is the same as the interest rate on the bonds, which is 7%.

$$\text{After-tax cost of debt} = k_d (1 - T)$$

$$\text{After-tax cost of debt} = 7 \times (1 - 0.25) = 5.25\%$$

$$\text{Market value of equity} = 5m \times 3.81 = \text{RM19.05 million}$$

$$\text{Market value of debt is equal to its par value of } \underline{\text{RM2 million}}$$

$$\text{Sum of market values of equity and debt} = 19.05 + 2 = \underline{\text{RM21.05 million}}$$

$$\text{WACC} = w_e k_e + w_d k_d (1 - T)$$

$$\text{WACC} = (10.5 \times 19.05/21.05) + (5.25 \times 2/21.05) = 10.0\%$$

(b) Ruparb Sdn. Bhd is now considering a project where they would open a new facility in Johor Bharu. The company's CFO has assembled the following information regarding the proposed project:

- It would cost RM500,000 today ( $t=0$ ) to construct the new facility. The cost of the facility will be depreciated on a straight-line basis over five years.
- If the company opens the facility, it would need to increase its inventory by RM100,000 at  $t=0$ . RM70,000 of this inventory will be financed by account payable.
- The CFO has estimated that the project will generate the following amount of revenue over the next 3 years:
  - Year 1 Revenue = RM1.0 million
  - Year 2 Revenue = RM1.2 million
  - Year 3 Revenue = RM1.5 million
- Operating costs excluding depreciation equal to 70 percent of revenue.
- The company plans to abandon the facility after three (3) years. At terminal year, the project's estimated salvage value will be RM200,000. At the same time, the company will also recover the net operating working capital investment that it made at  $t=0$ .
- The company tax rate is 27 percent.
- The project cost of capital is as per calculated in 3(a) above.

REQUIRED: What is the project's net present value?

	0	1	2	3
<b>Cost of Equipment</b>	<b>-500000</b>			
<b>NOWC (10000-70000)</b>	<b>-30000</b>			
<b>sales</b>		<b>1000000</b>	<b>1200000</b>	<b>1500000</b>
<b>Operating Costs(70%)</b>		<b>-700000</b>	<b>-840000</b>	<b>-1050000</b>
<b>Depreciation (500000 / 5 yrs)</b>		<b>-100000</b>	<b>-100000</b>	<b>-100000</b>
<b>Income Before Tax</b>		<b>200000</b>	<b>260000</b>	<b>350000</b>
<b>Tax – 27%</b>		<b>-54000</b>	<b>-70200</b>	<b>-94500</b>
<b>Income AfterTax</b>		<b>146000</b>	<b>189800</b>	<b>255500</b>
<b>Add: depreciation</b>		<b>100000</b>	<b>100000</b>	<b>100000</b>
<b>Operating Cash Flows</b>		<b>246000</b>	<b>289800</b>	<b>355500</b>
<b>Salvage Value (no gain no loss)</b>				<b>200000</b>
<b>Recovery of NOWC</b>				<b>30000</b>
<b>Operating Cash Flows</b>	<b>-530000</b>	<b>246000</b>	<b>289800</b>	<b>585500</b>
<b>VIF 10%</b>		<b>0.909</b>	<b>0.826</b>	<b>0.751</b>
<b>PV Cash Flows</b>	<b>-530000</b>	<b>223614</b>	<b>239274.8</b>	<b>439710.5</b>
		<b>902699.30</b>		
	<b>NPV =</b>	<b>-530000 + 902699.3 = 372699.3</b>		