ENGINEERING ECONOMY
SME4833

Chapter 5
MANAGEMENT ACCOUNTING AND SHORT TERM DECISION-MAKING

Lecturer

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Learning outcome

1. Decision making in accounting management.

2. Assumptions and cost-volume-profit analysis / breakeven / production level for target profit / sensitivity analysis for uncertainty.

3. The concept of relevant cost and short term decision making method.

MANAGEMENT ACCOUNTING AND SHORT TERM DECISION-MAKING

5.1 Introduction to Management Accounting

5.2 Cost-Volume-Profit Analysis

5.3 Short Term Decision Making

5.4 Chapter Summary

Materials in these slides are extracted from a published text. Readers who are interested to get detail explanation can refer to the following text:

Muhamad Zameri Mat Saman, Wan Harun Wan Harun Wan Hamid, Masine Md Tap, Rozlina Md Sirat. *Engineering Economy and Accounting for Engineers, Pearson Malaysia Sdn. Bhd., Malaysia, 2012.*

5.1 Introduction to Management Accounting

- Identify, report and define accounting information to determine startegy, planning and control, decision making and resource optimization.

- Use cost and financial data.

Relationship between management accounting, cost accounting and financial accounting.

1. Financial accounting – collecting financial data and making the financial statement.

2. Cost accounting – prepare data for management accounting.

3. Management accounting need to use data from cost accounting and financial accounting to maka analysis to assit management in planning, decision making and control.
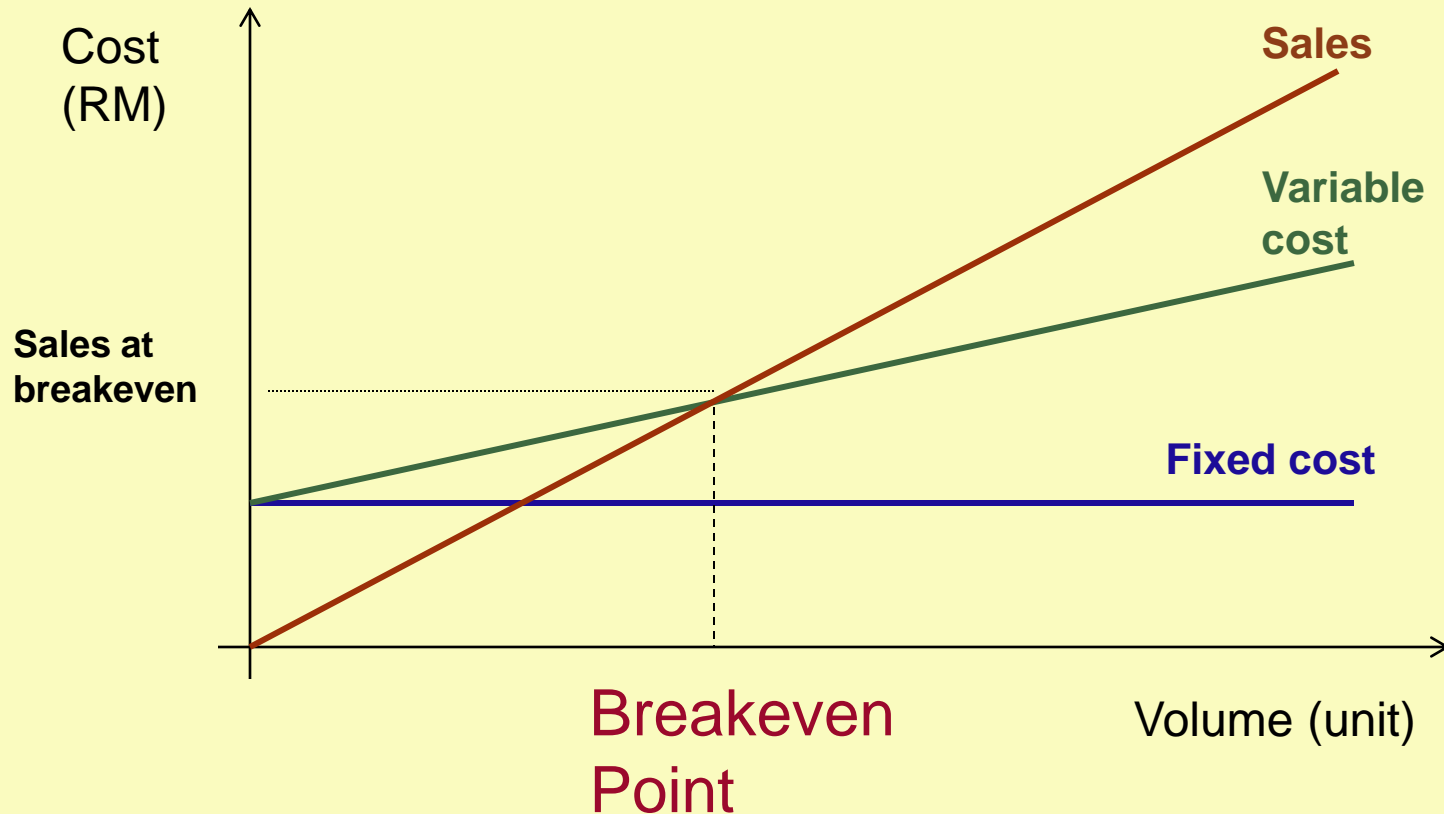
5.2 Cost-Volume-Profit Analysis

- Determine the relationship between cost, production volume and profit for different level of production.

- Determine the effect of changes in policy and strategy.

- As a guide to planning and short term decision for minor changes to level of activities.

- Not suitable for long term analysis or major changes to the level of activities.
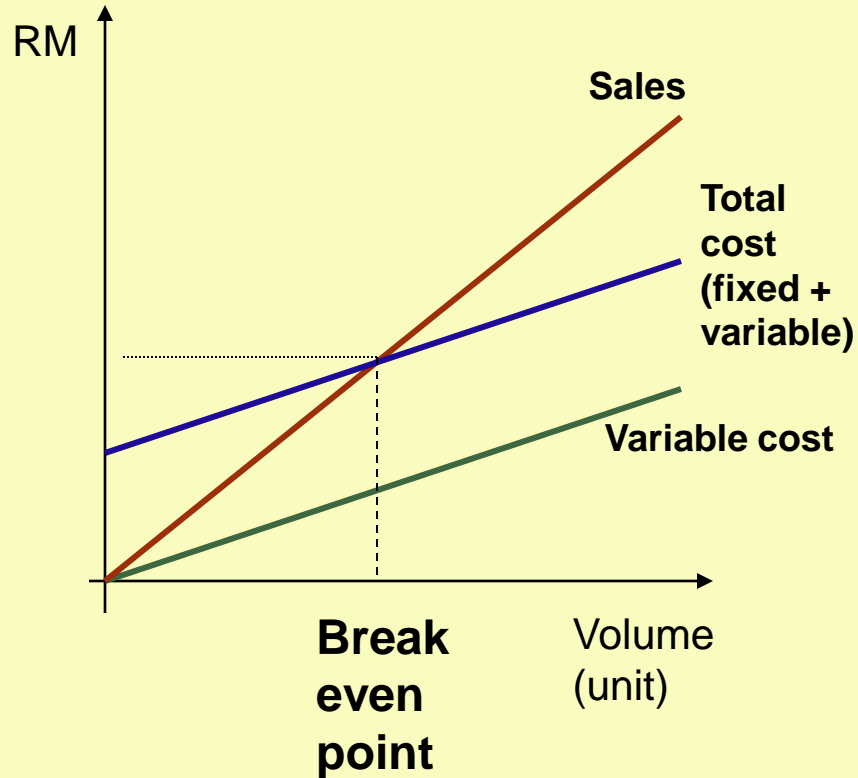
- For cases where only volume influence cost and income (assumption).

- Cost may be classified into 2 :
  - Variable cost
  - Fixed cost

- Fixed cost does not change with production volume.

- Total variable cost and total sales cost changes with changes in production volume.

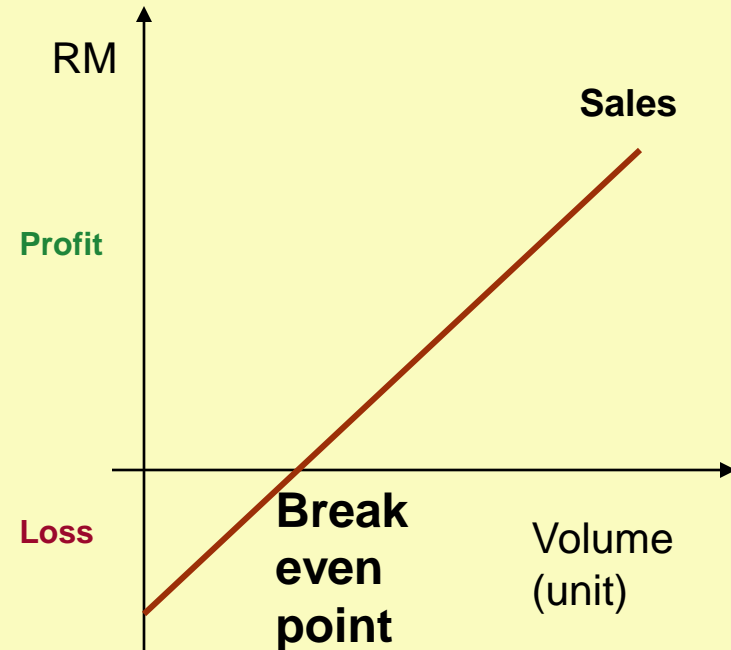## Relationship between cost-volume-profit may be shown in the breakeven chart

Breakeven Chart

- Cost (RM) *(y-axis)*
- Sales
- Variable cost
- Sales at breakeven
- Fixed cost
- Breakeven Point
- Volume (unit) *(x-axis)*

Breakeven contribution chart

Profit chart

- Breakeven point (unit) = <u>Fixed Cost</u>

  (Sale price/unit – variable cost/unit)

  = Fixed cost/ contribution per unit

- Contribution/sales Ratio = <u>Contribution per unit x 100</u>

  (C/S Ratio   ) Sale price per unit

- Breakeven point (RM) = Breakeven point (unit) x unit sale price

  = <u>Fixed cost x unit sale price</u>

  Contribution per unit

  = <u>Fixed cost</u>

  C/S ratio

- Activity level at target profit (unit) = Fixed cost + target profit
$$\text{Contribution per unit}$$

- Safety margin (unit)   = Current sale volume – Breakeven point (unit)

- % safety margin   = (Safety margin/sales) x 100%

Example 1:
A company produces a product and sells it at RM 20 per unit. Marginal cost is RM12 per unit and fixed cost is RM120,000 per year.

- Calculate :
    - Number of units for breakeven.
    - Sales in RM to breakeven.
    - Contribution to sales (C/S) ratio.
    - Sales quantity that will generate RM40,000 profit per year.
    - Sales in RM per year that will generate RM40,000 profit.
    - If variable cost increases to RM13.00/unit and fixed cost increases to RM140,000/year. Unit sale price has not changed, what unit of sales is required to achieve target profit of RM40,000 per year?

Example 2

CEC Trading Sdn Bhd – Variable cost is RM8/unit and sale price is RM20/unit. Profit is RM500,000/year (after deducting RM100,000 fixed overhead).

Marketing manager is suggesting to reduction in sale price. It is expected that sales will increase as follows:

Alternatives	Percentage in the sale price reduction	Percentage in the increase in sales
1	10%	30%
2	7.5%	20%
3	5%	10%

Calculte the profit for each alternative and suggest the alternative that the company should select.

Example 3

Yahya Products Sdn Bhd – produces kitchen equipment. Variable cost is RM150/unit. Sale price is RM400/unit. Net profit is RM750,000/year (after deducting RM250,000 fixed cost) It is suggested that next year the sales price is reduced by 12.5% of the current sales price. By doing this it is expected that there will be a 20% increase in the current unit sales.

Calculate the total profit and determine if this strategy should be implemented next year.

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5.3 Short Term Decisions

- Decisions that need to be made regarding :
  - Product price.
  - Breakeven quantity.
  - Competitive minimum per unit price.
  - The effect of changes in sales cost and price to the breakeven point.
  - The acceptance of special offers (discounts)
  - Continuation and discontinuation of a product.
  - To make in-house or buy from external sources.
  - The choice of multi product mix with limited input resources.

Marginal costing and decision making

Relevant Costs:

- Only relevant cost should be considered. Historical costs and sunk costs is not relevant in this analysis.

- Similar costs in every alternative may be ignored.

Decision to accept or reject a special order

- Special orders are usually at a lower price than the normal sales price.

- Need to consider if company can use the extra un-used capacity (assume fixed cost does not change).

- Need to identify contribution from the product.

Example 4:
Sales price of product A is RM0.20 per unit. Total production is 400,000 units (80% of production capacity). Total production cost to produce 400,000 units is $56,000 inclusive of fixed cost RM16,000.
A customer offer to a one-off purchase of 100,000 unit at RM0.13 per unit.
Should this offer be accepted?

Normal production
Variable cost per unit = (RM56,000 – RM16,000)/400,000 = RM0.10 per unit

Marginal Costing:

	RM
Sale (400,000 x 0.20)	**80,000**
- variable cost	**(40,000)**
contribution	**40,000**
- fixed cost	**(16,000)**
NET PROFIT	**24,000**

Extra income if offer is accepted:

Sale (100,000 x RM0.13)	**RM13,000**
Variable cost (100,000 x RM0.10)	**(RM10,000)**
Contribution	**RM3,000**

Assumes that fixed cost is assigned to normal production.

- Factors to be considered before accepting special offers:
  - There is no other way to use the extra unused capacity.

  - May cause a reduction in market demand.

  - Factory capacity may not be enough to increase production to sell at normal price should the opportunity arise.

  - Is it true that fixed cost will not increase if this offer is accepted?

The decision to continue or discontinue a product

- For a company that produces multi products, decision may have to be made to discontinue a product that shows loss.

Example 5 :

Product (RM x 1000)

	X	Y	Z	Total
Sales	32	50	45	127
Total cost	36	38	34	108
Profit (loss)	(4)	12	11	19

Total cost consists of 2/3 variable cost and 1/3 fixed cost

Should product X be discontinued because it shows loss.

Operation statement based on marginal costing

Product (RM x 1000)

		X	Y	Z	Total
Sale		32	50	45	127
- Variable cost	24	25.333	22.667	72	
Contribution		8	24.667	22.333	55
- Fixed cost (total accumulated)					36
Profit (loss)					19

2/3 x 36

1/3 x (36 + 38 + 34)

If product X is discontinued, total profit is :

Contribution of product X	0
Contribution of product Y	RM24,667
Contribution of product Z	RM22,333
Total contribution	RM47,000
- Fixed cost	RM36,000)
Profit	RM11,000

If make X, Y and Z, profit	= RM19,000
If make Y and Z only, profit	= RM11,000
Profit gain / (reduce) if do not make X	= RM8,000

Suggestion : Continue making X.

Factors that need to be considered before accepting this suggestion;

1. **There is no other product that is more profitable than X.**

2. **Fixed cost cannot be reduced.**

Decision to make or buy

- For products or component that are made to be sold or used in the assembly of a product.

- Only need to compare between the price of buying from a supplier with the variable cost of making the product.

- Fixed cost still need to be paid whether the component is bought from supplier or self-made.

Example 6 :

A total of 50,000 units of product K is produced and cost data are as follows:

Material	RM2.50 per unit
Labour	RM1.25 per unit
Variable overhead	RM1.75 per unit
Fixed overhead	RM3.50 per unit
Total cost	RM9.00 per unit

Product K may be bought from a supplier at the price of RM7.75 per unit.

Should product K be discontinued and just buy it from the supplier when needed?

- Only variable cost is relevant because fixed cost still has not changed.

External price of component	RM7.75 per unit
Cost if self-made	RM5.50 per unit*
Savings (if self-made)	RM2.25 per unit

Variable cost = RM2.50+RM1.25+RM1.75 = RM5.50

Total loss if buy from supplier :
= 50,000 units x RM2.25 per unit = RM112,000

It is suggested that the company continue making the component themselves.

Strategy for multi product with   limited factors.

- Company usually have limited resources to produce multi product.

- How to select the combination of product to suit the existing limitations.

Example 7

:   Estimated budget for the production of four products are as follows:

	W		X		Y		Z	
Sales / unit	20		30		40		36	
Variable cost / unit:								
Labour cost per unit (RM2/hour)	6		4		14		10	
Material cost per unit (RM1/kg)	6	12	18	22	10	24	12	22
Contribution / unit	8		8		16		14	

Resource requirement / unit

	W	X	Y	Z
Labour hour/ unit (Hour / unit)	3	2	7	5
Material /unit (Kg / unit)	6	18	10	12
Maximum demand (unit)	5000	5000	5000	5000

For each of these cases, suggest the optimum product mix:
Case 1- Labour hour is limited to 50,000 hour
Case 2- Raw material is limited to 110,000

- **Solution : Calculate contribution ration for each unit of the limited resource, determine the product priority and then determine the product combination that generates the optimum profit.**

The product priority is based on contribution ratio:

	Product (in RM)			
	W	X	Y	Z
Contribution per unit	8	8	16	14
Contribution per labour hour	2.67	4.0	2.29	2.8
Priority – Case 1	[3]	[1]	[4]	[2]
Contribution per kg material	1.33	0.44	1.60	1.17
Priority – Case 2	[2]	[4]	[1]	[3]

8 RM per unit
3 labour hours per unit

8 RM per unit
6 Kg per unit

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- Case 1 : Limited labour

Total labour hour to fulfill maximum demand :

(5000x3) + (5000x2) + (5000x7) + (5000x5) = 85,000 hour

Because the total labour hour is only 50,000 hours, labour resouce must be distributed based on priority.

Priority 1 : product X = 5000 unit x 2 hour = 10,000 labour hour

Priority 2 : product Z = 5000 unit x 5 hour = 25,000 labour hour

Priority 3 : product W = 5000 unit x 3 hour = <u>15,000 labour hour</u>

<div align="right"><u>50,000 labour hour</u></div>

Product Y is not produced due to lack of labour resource.

- Case 2 : Material is limited

Total material required to fulfill maximum demand :

$$(5000 \times 6) + (5000 \times 18) + (5000 \times 10) + (5000 \times 12) = 230,000 \text{ kg}$$

Because total material is only 110,000 kg, material need to be distributed based on priority:

Priority 1 : product Y = 5000 units x 10 kg = 50,000 kg

Priority 2 : product W = 5000 units x 6 kg   = 30,000 kg

Priority 3 : product Z = 2500* units x 12 kg   = <u>30,000 kg</u>

<div align="right"><u>110,000 kg</u></div>

Only a part of the demand for product Z may be fulfilled due to lack of material.

*Total = (110000-50000-30000)kg / 12kg per unit = 2500 units

Product X is not produced due to lack of material.

Example 8

KL Enterprise: Makes 2 products, K and L that was sold at the price of RM5/unit and RM2.50/unit respectively

Item	K (RM)	L (RM)
Sales	50,000	50,000
Direct material cost	15,000	25,000
Direct labour cost	13,000	20,000
Variable cost	4,000	6,000
Fixed overhead	8,000	5,000
Net profit (loss)	10,000	(6,000)

Consider whether to discontinue product L to increase profit.

Example 9

Product	X	Y	Z
Total production (Units)	600	500	800
Sales/Unit	RM 296	RM 524	RM 410
Variable cost: Raw material RM8/kg Direct labour RM5/hour	RM72 RM40	RM144 RM60	RM96 RM50
Fixed cost: Factory overhead Management overhead	RM88 RM30		
Total cost	RM230	RM390	RM290
Profit	RM66	RM134	RM120

Company's budget shows that to produce 3 types of product X, Y and Z for 6 months will require 24,000 kg raw material K. However for the next 6 months only 15,000 kg of K is available.

Calculate:

1) **Contribution per unit of each product.**

2) **Product ranking according to profit based on the limited material.**

3) **Production quantity of each product to maximize total profit.**

5.4 Chapter Summary

- **Advantages and disadvantages of breakeven analysis.**
- Advantages
    - Quick
    - Easy to understand
    - Cheaper
    - Quite stable in the specified range.

- Disadvantages
    - Answer is only suitable for production volume in the specified range.
    - Not suitable if variable cost and sales price is not proportional to the volume (such as due to discounted purchase and
    - For short term only.
    - Assumes that cost is only dependent on quantity.