Chapter 21 Cost-Volume-Profit Analysis

Contribution margin (邊際貢獻)

Unit contribution margin = Unit selling price – Unit variable costs

Total contribution margin = Total sales revenue – Total variable costs / Sales unit x unit contribution margin

Example 1: The financial data of BAFS Catering Ltd is as follows:

Sales	$200,000
Fixed costs	$1,500,000 per month
Selling price of lunch box	$20 each
Variable costs	$8 each

Find the unit contribution margin and total contribution margin.

Unit contribution margin = Unit selling price − Unit variable costs = $20 – $8 = $12

Sales unit = $200,000 ÷ $20 = 10,000 units

Total contribution margin = Sales unit x unit contribution margin = 10,000 x $12 = $120,000

Contribution margin ratio (邊際貢獻率)

$$\textbf{Contribution margin ratio (\%)} = \frac{\text{Unit contributi on margin}}{\text{Unit selling price}} = \frac{\text{Total contributi on margin}}{\text{Total Sales revenue}}$$

HKDSE (2013, 6) **(Cost-Volume-profit analysis)**

Eva Company manufactures stainless steel mailboxes. The budgeted income statement for the year 2014 is as follows:

	$
Sales	960,000
Direct material cost	(120,000)
Direct labour cost	(150,000)
Fixed production overheads	(190,000)
Variable production overheads	(66,000)
Fixed administrative overheads	(57,000)
Net profit	377,000

REQUIRED: (a) Compute the contribution margin ratio (as a percentage) for the mailboxes

(a) Contribution margin = $960,000 – ($120,000 + $150,000 + $66,000) = $624,000

Contribution margin ratio = $624,000 / $960,000 = 65%

Contribution margin is used to cover fixed costs (邊際貢獻用作抵銷固定成本)

— 當一個企業銷售產品，售價將首先被用來抵銷的變動成本，而餘額則用於支付固定成本，並賺取利潤。

Net profit / (loss) = Total contribution margin – Total fixed costs

Example 2 : The financial data of BAFS Catering Ltd is as follows:

Sales	200,000
Fixed costs	$1,500,000 per month
Selling price of lunch box	$20 each
Variable costs	$8 each

Find the net profit or loss.

Total contribution margin =($20 – $8) x 200,000 = $2,400,000

Net profit = $2,400,000 – $1,500,000 = $900,000

Break-even point (保本點銷售數量)

— 保本點是指總銷售收入等於生產總成本時(收支平衡)，生產或銷售數量。(我們假設產量等於銷量)

Cost-volume-profit analysis (本量利分析/保本分析)

— 本量利分析可以讓我們知道生產或銷售多少產品，才能達到收支平衡，即能抵銷固定費用。
— 變動成本，固定成本，售價及生產量都會涉及本量利分析。

Relationship between contribution margin and break-even point (邊際貢獻與保本點之間的關係)

— 邊際貢獻使我們能夠找出銷售收入如何抵銷固定成本。
— 由於總成本是由可變和固定成本組成，保本點是和邊際貢獻聯繫在一起的。

Break-even point: Total contribution margin = Total fixed costs

Classwork 3

1 Classics Ltd manufactures and sells two products: X and Y. The revenue and cost information is as follows:

	Product X	*Product Y*
Sales in units	200,000	300,000
Selling price per unit	$30	$15
Variable costs per unit	$10	$6

If the company is at break-even sales, find the fixed cost.

Total contribution margin =($30 – $10) x 200,000 + ($15 – $6) x 300,000 = $6,700,000

At break-even point : Total fixed costs = total contribution margin = $6,700,000

Break-even point calculation methods (保本點的計算方法)

2 **Contribution margin method (邊際貢獻計算法)**
3 **Contribution margin ratio method (邊際貢獻率計算法)**

2. Contribution margin method (邊際貢獻計算法)

In unit (以售出單位計算)

Break-even point (in units) = Total Fixed costs / Unit contribution margin

In amount (以售出金額計算)

Break-even point (in dollars) = Break-even point (in units) x Unit selling price

Example 5

The financial data of BAFS Catering Ltd is as follows:

Fixed costs	$1,500,000
Selling price of lunch box	$20 each
Variable costs	$8 each

Compute the break-even point in sales units and sales revenue using the contribution margin method.

Unit contribution margin = $20 – $8 = $12

Break-even point (in units sold) = $1,500,000 / $12 = 125,000 units

Break-even point (in dollars) = 125,000 × $20 = $2,500,000

HKDSE (2015, 4) **(Cost-Volume-profit analysis)**

Peter Company plans to sell 3,000 pairs of shoes at $350 per pair. Relevant financial information is given below:

	$
Fixed production overheads	150 000
Fixed selling and administrative expenses	228 000
Direct materials per pair of shoes	45
Direct labour per pair of shoes	55
Variable production overheads per pair of shoes	18
Sales commission per pair of shoes	22

(a) Calculate the contribution margin for each pair of shoes.
(b) Calculate the sales quantity of shoes at the breakeven point.

(a) Contribution margin for each pair of shoes = $350 – $45 – $55 – $18 – $22 = $210

Break-even point (in units sold) = ($150,000 + $228,000) / $210 = 1,800 units

3. Contribution margin ratio method (邊際貢獻率計算法)

— 利用邊際貢獻率計算保本點

Break-even point (in dollars) = Total Fixed costs / Contribution margin ratio

Example 6

The financial data of BAFS Catering Ltd is as follows:

Fixed costs $1,500,000 Selling price of lunch box $20 each Variable costs $8 each

Compute (i) the contribution margin ratio

(ii) the break-even point in sales revenue.

(i) The contribution margin ratio = ($20 – $8) / $20 x 100% = 60%

(ii) Break-even point (in sales revenue) = $1,500,000 / 60% = $2,500,000

HKDSE (2013, 6) **(Cost-Volume-profit analysis)**

Eva Company manufactures stainless steel mailboxes. The budgeted income statement for the year 2014 is as follows:

	$
Sales	960,000
Direct material cost	(120,000)
Direct labour cost	(150,000)
Fixed production overheads	(190,000)
Variable production overheads	(66,000)
Fixed administrative overheads	(57,000)

(a) Compute the contribution margin ratio (as a percentage) for the mailboxes
(b) Compute the breakeven sales of the mailboxes for 2014.

(a) Contribution margin = $960,000 – ($120,000 + $150,000 + $66,000) = $624,000

Contribution margin ratio = $624,000 / $960,000 = 65%

(b) The breakeven sales = ($190,000 + $57,000) / 65% = $380,000

Target profit analysis (目標利潤分析)

— 本量利分析可以被用來計算達到目標利潤的銷量或銷售收入。

— 這就是所謂的目標利潤分析

Units sold = $\frac{\text{Fixed costs} + \text{Target net profit}}{\text{Unit Contributi on margin}}$	**Sales revenue =** $\frac{\text{Fixed costs} + \text{Target net profit}}{\text{Contributi on margin ratio}}$

Example 10

The financial data of BAFS Catering Ltd is as follows:

Sales	$200,000
Fixed costs	$1,500,000
Selling price of lunch box	$20 each
Variable costs	$8 each

BAFS Catering Ltd wants to earn a net profit of $600,000. How many lunch boxes does it have to produce and sell?

Unit contribution margin = Unit selling price − Unit variable costs = $20 – $8 = $12

Unit sold = ($1,500,000 + $600,000) / $12 = 175,000

HKDSE (2013, 6) **(Cost-Volume-profit analysis)**

Eva Company manufactures stainless steel mailboxes. The budgeted income statement for the year 2014 is as follows:

	$
Sales	960,000
Direct material cost	(120,000)
Direct labour cost	(150,000)
Fixed production overheads	(190,000)
Variable production overheads	(66,000)
Fixed administrative overheads	(57,000)

REQUIRED:

(a) Compute the contribution margin ratio (as a percentage) for the mailboxes

(b) How much sales revenue does Eva Company have to earn in order to achieve a target profit of $403,000?

(a) Contribution margin = $960,000 – ($120,000 + $150,000 + $66,000) = $624,000

Contribution margin ratio = $624,000 / $960,000 = 65%

(b) Sales revenues = ($190,000 + $57,000 + $403,000) / 65% = $1,000,000

HKDSE (2015, 4) **(Cost-Volume-profit analysis)**

Peter Company plans to sell 3,000 pairs of shoes at $350 per pair. Relevant financial information is given below:

	$
Fixed production overheads	150,000
Fixed selling and administrative expenses	228,000
Direct materials per pair of shoes	45
Direct labour per pair of shoes	55
Variable production overheads per pair of shoes	18
Sales commission per pair of shoes	22

REQUIRED:

(a) Calculate the contribution margin for each pair of shoes.

(b) How much sales revenue does Peter Company have to earn in order to achieve a target profit of $168,000?

(a) Contribution margin for each pair of shoes = $350 – $45 – $55 – $18 – $22 = $210

(b) Sales revenue = ($150 000 + $228 000 + $168 000) / $210 x $350 = $910 000

Cost-volume-profit analysis summary

Sales (profit)	≠	Sales (break-even)	≠	Sales(loss)
Unit of sales	≠	Unit of sales	≠	Unit of sales
Unit selling price	=	Unit selling price	=	Unit selling price
Unit variable cost	=	Unit variable cost	=	Unit variable cost
Total variable cost	≠	Total variable cost	≠	Total variable cost
Fixed cost	=	Fixed cost	=	Fixed cost
Unit contribution	=	Unit contribution	=	Unit contribution
Total contribution	≠	Total contribution	≠	Total contribution
Contribution margin ratio	=	Contribution margin ratio	=	Contribution margin ratio

Margin of safety (安全邊際)

— 實際或預算銷售收入和保本銷售收入之間的差額稱為安全邊際。

— 安全邊際告訴我們，在損失發生前，銷量或銷售收入可下跌的程度有多遠。

In amount (以售出金額計算)

Margin of safety (in revenue) = Actual/Budgeted sales revenue – Break-even sales revenue

In unit (以售出單位計算)

Margin of safety (in unit) = Actual/Budgeted sales unit – Break-even sales unit

Margin of safety ratio (安全邊際率)

— 可以以百分比表示安全邊際，這就是所謂的安全邊際率。

$$\textbf{Margin of safety ratio (\%)} = \frac{\text{Margin of safety (in units)}}{\text{Actual/Budgeted sales (in units)}} = \frac{\text{Margin of safety (in \$)}}{\text{Actual/Budgeted sales (in \$)}}$$

HKDSE (2018, 6) **(Cost-Volume-profit analysis)**

6. Yummy Limited is a dim sum restaurant. Its monthly operation details for 2018 are as follows:

Average number of customers per month	35,000
Average sales revenue per customer	$100
Variable production cost	45% per revenue dollar
Monthly fixed costs:	$
Rent	350,000
Salalry	741,000
Depreciation	81,970
Other operating expenses	316,000

The following changes in costs are expected for 2019:

— increase in variable production cost to 48% per revenue dollar

— increase in monthly rent by 15% when the lease contract is renewed at the beginning of 2019

— increase in salary and other operating expenses by 5%

REQUIRED: (a) Calculate the monthly margin of safety for Yummy Limited in 2019 (in sales dollars).

(a) Contribution margin for each customer = $100 x (1 – 48%) = $52

Total monthly fixed costs = 350,000 x (1 + 15%) + 741,000 (1+5%) + 81,970 + 316,000(1 + 5%) = $1,594,320

Break-even sales (in unit) = $1,594,320 / $52 = 30,660 units

Break-even sales (in dollars) = 30,660 x $100 = $3,066,000

The monthly margin of safety (in sales dollars) = 35,000 x $100 – $3,066,000 = $434,000

Classwork 8

1 Eggplant Ltd produces and sells a single product. The costs per unit are as follows:

Direct materials	$100
Direct labour	$60
Variable manufacturing overheads	$10
Fixed manufacturing overheads	$8.5
Variable non-manufacturing overheads	$20
Fixed non-manufacturing overheads	$4

Fixed costs for the year amount to $1,000,000. The budgeted sales volume is 80,000 units and the selling price is $280 per unit.

(a) Calculate: (i) Contribution margin ratio, (ii) Break-even sales revenue and (iii) Margin of safety ratio

(a) (i) Unit contribution margin = $280 – ($100 + $60 + $10 + $20) = $90

Contribution margin ratio = $90 ÷ $280 = 32.14%

(ii) Break-even sales revenue = $1,000,000 ÷ 32.14% = $3,111,387.68

(iii) Margin of safety ratio = {[(80,000 × $280) – $3,111,387.68] ÷ (80,000 × $280)} = 86.11%

(HKALE 2008, Paper 2, 2) **(Cost-volume-profit analysis)**

Arial Ltd is a direct competitor of Dream Ltd. It manufactures only one product, *Pop-Standard*, which is essentially the same as Dream Ltd's Standard chocolates. Dream Ltd is considering the acquisition of Arial Ltd.

Dream Ltd estimates the following monthly figures of *Pop-Standard*:

	$
Sales at breakeven point	500,000
Total fixed costs	200,000
Net operating income (net profit)	440,000

REQUIRED:

(a) Compute the contribution margin ratio (as a percentage) for the *Pop-Standard*

(b) Based on the estimated figures given, calculate the monthly sales of Arial Ltd and its margin of safety.

The management of Dream Ltd is confident that after the acquisition, Arial Ltd will be able to attain a variable cost to sales ratio at 55%.

REQUIRED:

(c) Calculate the new monthly breakeven sales for Arial Ltd after the acquisition.

(a) Contribution margin at breakeven pint = Total fixed costs = $200,000

Contribution margin ratio = $200,000 / $500,000 x 100% = 40%

(b) Net operating income = Monthly sales – total variable cost – Total fixed costs

$440,000 = Monthly sales – total variable cost –200,000

$440,000 = Contribution margin –200,000

Contribution margin = $640,000

Monthly sales = $640,000/40% = $1,600,000

Margin of safety = $1,600,000 – $500,000 = $1,100,000

(c) Contribution margin ratio = 1 – 55% = 45%

Break-even sales = $200,000 ÷ 45%

= $444,445

CVP analysis for multiple products (為多種產品進行的本量利分析)

The break-even point for multiple product situations can be found by two approaches:

1 Equation approach (方程式計算法)

2 Weighted average sales mix contribution approach (加權平均銷售組合邊際貢獻計算法)

Example 11

Suppose BAFS Catering Ltd provides two kinds of lunch boxes:

Lunch box	Selling price	Variable costs
Local	$20	$8
Continental	$30	$12

Let's assume that the sales mix is 80% local and 20% continental and fixed costs $1,500,840. Find the breakeven point of two kinds of lunch boxes?

Weighted average sales mix contribution approach (加權平均銷售組合邊際貢獻計算法)

Unit contribution margin for local lunch box = $20 – $8 = $12

Unit contribution margin for continental lunch box = $30 – $12 = $18

Sales mix contribution = $12 x 4 + $18 = $66

Break-even sales volume (per sales mix) = Fixed costs ÷ Sales mix contribution

= $1,500,840/$66 = 22,740 units

No. of local lunch boxes to be sold to break even = 22,740 x 4 = 90,960 units

No. of continental lunch boxes to be sold to break even = 22,740 units

HKDSE (2014, 4) **(Cost-Volume-profit analysis)**

Beauty Sports Company produces and sells two types of aerobic-training products: instructional DVDs and dancer kits. Information on the two products in 2014 is as follows:

	DVD	Dancer Kit
Unit selling price	$150	$600
Unit variable cost	$30	$125

The annual total fixed cost is $860,000.

REQUIRED:

(a) In 2014, Beauty Sports Company sold 25,000 DVDs and 5,000 dancer kits. Assuming that the ratio of the sales quantity of the two products will be maintained, calculate the sales quantity of each product in 2014 at the breakeven point.

(b) Calculate the margin of safety in sales dollars for Beauty Sports Company in 2014.

(a) Unit contribution margin of DVD = $150 – $30 = $120

Unit contribution margin of Dancer Kit = $600 – $125 = $475

The contribution margin per sales mix of DVD and Dancer Kit = $120 x 5 + $475 x 1 = $1,075

Total breakeven sales quantity (per sales mix) = $860,000 / $1,075 = 800 units

The breakeven sale quantity of DVD = 800 x 5 = 4,000 unit.

The breakeven sale quantity of dancer kit = 800 units

(b) margin of safety in sales dollars = 25,000 x $150 + 5,000 x $600 – 4,000 x $150 – 800 x $600

= $5,670,000

CVP analysis with limiting factors (在有限因素下進行本量利分析)

在一些業務情況下，公司會面臨有限的資源限制。它們會限制產品的產量，例如，原材料(raw materials)，機器小時(machine hours)，勞工小時(labour hours)等等。

Step 1: Find the contribution margin of limiting factor (第一步：找出有限因素的邊際貢獻)

Contribution margin of limiting factor = Total contribution margin / Total limiting factor

Contribution margin of limiting factor = Unit contribution margin / Unit limiting factor

Step 2: Rank the two products (第二步：將兩種產品排序)

Step 3: Determine the production volumes of the two products (第三步：定出兩種產品的產量)

Example 12

Suppose BAFS Catering Ltd provides two kinds of lunch boxes, the detailed breakdown of variable costs as follows:

	Local Lunch box	Continental Lunch box
	$	$
Sales prices	20	30
Variable costs:		
Direct materials	(3)	(5)
Direct labour	(2)	(4)
Overheads	(3)	(3)

Suppose each direct labour hour costs $20 and **only 14,000** direct labour hours are available. The budgeted demands (in units) for local and continental lunch boxes are 120,000 units and 30,000 units, respectively. If the fixed costs of the company is $1,500,000, find the net profit of the company.

Unit contribution margin for local lunch box = $20 – ($3 + $2 + $3) = $12

Unit contribution margin for continental lunch box = $30 – ($5 + $4 + $3) = $18

Direct labour hours per unit of local lunch box = $2 ÷ $20 = 0.1 direct labour hour

Contribution per direct labour hour of local lunch box = $12 ÷ 0.1 = $120 per direct labour hour

Direct labour hours per unit of continental lunch box = $4 ÷ $20 = 0.2 direct labour hour

Contribution per direct labour hour of continental lunch box = $18 ÷ 0.2 = $90 per direct labour hour

Local lunch boxes should be produced first as they are more profitable. Therefore, they are ranked one.

Number of direct labour hour of producing 120,000 local lunch boxes = 120,000 x 0.1 = 12,000 direct labour hour

Direct labour hours left for the continental lunch box = 14,000 – 12,000 = 2,000 hours

The number of continental lunch to be produced = 2,000 / 0.2 = 10,000 units

Contribution Income Statement for the month

		$
Local lunch box	120,000 x $12	1,440,000
Continental lunch box	10,000 x $18	180,000
Total contribution		1,620,000
Less Fixed costs		(1,500,000)
Net profit		120,000

HKDSE (2013, 6) **(Cost-Volume-profit analysis)**

Eva Company manufactures stainless steel mailboxes. The budgeted income statement for the year 2014 is as follows:

	$
Sales	960,000
Direct material cost	(120,000)
Direct labour cost	(150,000)
Fixed production overheads	(190,000)
Variable production overheads	(66,000)
Fixed administrative overheads	(57,000)
Net profit	377,000

REQUIRED:

(a) Compute for the mailboxes
- (i) the contribution margin ratio (as a percentage)
- (ii) the breakeven sales for 2014.
- (iii) the margin of safety (as a percentage up to two decimal places) for 2014.

(b) Assume that the management of Eva Company is considering offering a 5% commission on all sales.
- (i) Recompute the contribution margin ratio (as a percentage)
- (ii) Recompute the breakeven sales for 2014 (to the nearest dollar) and state the effect of the sales commission on breakeven sales.
- (iii) If the management expects sales revenues to be increased by $100,000 because of this, would you recommend Eva Company to offer the sales commission? Show your calculations.

(c) Why is a decline in the margin of safety an issue of concern to the management of a company?

(a) (i) Contribution margin = $960,000 – ($120,000 + $150,000 + $66,000) = $624,000

Contribution margin ratio = $624,000 / $960,000 = 65%

(ii) Total fixed overheads = $190,000 + $57,000 = 247,000

The breakeven sales = 247,000 / 65% = $380,000

(iii) Margin of safety = ($960,000 – $380,000) ÷ $960,000 = 60.42%

(b) (i) Contribution margin = $960,000 – ($120,000 + $150,000 + $66,000 + $960,000 x 5%) = $576,000

Contribution margin ratio = $576,000 / $960,000 = 60%

(ii) The breakeven sales = 247,000 / 60% = $411,667

Sales commission is a variable cost and it will decrease the contribution margin ratio. As the fixed costs remain unchanged, the breakeven sales will increase by $31,667 ($411,667 – $380,000)

(iii) The contribution without offering the sales commission = $624,000

If the sales revenues increased by $100,000, the contribution = ($960,000 + $100,000) x 60% = $636,000

The Net profit of offering the sales commission = $636,000 – $247,000 = $389,000

The net profit of offering the sales commission is greater than the original by $12,000 ($389,000 – $377,000). Eva company should offer the sales commission.

(c) — sales are moving closer to the breakeven point

— profit is going down and the possibility of lost is greater

HKDSE (2012, 8) **(Cost-volume-profit and decision-making)**

Lucky Company is a local manufacturer selling a single product, DC. The company plans to produce and sell at its maximum capacity of 80 000 units in 2013. The following estimates relating to DC have been made for 2013:

	$
Manufacturing costs:	
Direct materials	480 000
Direct labour	320 000
Production overheads	1 000 000
Non-manufacturing costs:	
Selling expenses	900 000
Administrative expenses	528 500

Additional information:

(i) 20% of the production overheads are variable costs.

(ii) Two-thirds of the selling expenses are fixed while the remaining balance is the sales commission, which varies with the number of units sold.

(iii) Administrative expenses are all fixed.

REQUIRED:

(a) Calculate

(1) the total fixed costs of 80 000 units of DC; and

(2) the total variable costs of 80 000 units of DC.

At a regular meeting of the company, the sales manager reports that one of its competitors is going to launch a product similar to DC. As a result, he expects that the sales volume of DC will drop to 48 000 units in 2013 if its selling price is maintained at $49.5 per unit. The management prefers not to have any price deduction in the local market, and is considering adopting one of following alternatives in 2013 to solve the problem:

Alternative A

The company pays an additional sales commission of 10% on the selling price, and increases advertising expenses by $52 500 per annum. By doing so, the expected sales volume of DC is 76 000 units.

Alternative B

The company produces and sells 48 000 units in the local market, and uses its excess capacity to accept an offer from a mail-order house to sell at most 40 000 units of DC to overseas markets at a unit selling price of $37.5. Under the agreement, **no sales commission** is to be paid to the mail-order house but a total of $25 000 per month is to be paid by Lucky Company to cover the cost of producing the mail-order catalogue.

REQUIRED:

(b) Calculate the respective breakeven point (in units) of DC under Alternative A and Alternative B.

(c) Suppose Lucky Company has to choose one of the alternatives. Explain which alternative you would recommend to the management based on the respective total profits calculated under each alternative.

(d) Other than total profit, explain one financial factor that Lucky Company should consider if it decides to adopt Alternative B.

Suppose the Company adopts Alternative A and considers reducing the cost of production through production process automation. If a piece of equipment with a rental cost of $125 000 per annum is hired, the direct labour cost is expected to be reduced by 40%.

(e) Should Lucky Company hire the equipment? Support your answer with calculations.

(a) (1)

	$
Fixed production overheads ($1,000,000 x 80%)	800,000
Fixed selling expenses ($900,000 x 2/3)	600,000
Administrative expenses	528,500
Total fixed costs	1,928,500

(2)

	$
Direct materials	480,000
Direct labour	320,000
Variable production overheads ($1,000,000 x 20%)	200,000
Variable selling expenses ($900,000 x 1/3)	300,000
Total variable costs	1,300,000

(b)

Alternative A

	Per unit
	$
Selling price	49.5
Less Variable costs:	
Original variable costs ($1,300,000 / 80,000)	16.25
Sales commission ($49.5 x 10%)	4.95
Contribution per unit	28.3

Total fixed cost = $1,928,500 + $52,500 = $1,981,000

Breakeven point (in units) = $1,981,000 / 28.3 = 70,000 units

Alternative B

Local contribution:

	Per unit
	$
Selling price	49.5
Less Original variable costs ($1,300,000 / 80,000)	16.25
Contribution per unit	33.25

Mail-order contribution

	Per unit
	$
Selling price	37.5
Less Original variable costs without sales commission ($1,000,000 / 80,000)	12.5
Contribution per unit	25

Total fixed cost = $1,928,500 + $25,000 x 12 = $2,228,500

Total existing contribution = $33.25 x 48,000 = $1,596,000

Required fixed cost for mail-order house = $2,228,500 – $1,596,000 = $632,500

Additional units for mail-order house to breakeven = $632,500 / $25 = 25,300 units

Breakeven point (in units) = 48,000 + 25,300 = 73,300 units

(c)

Alternative A

	Per unit
	$
Local contribution ($28.3 x 76,000)	2,150,800
Less: Total fixed cost	(1,981,000)
Net profit	169,800

Alternative B

	Per unit
	$
Local contribution ($33.25 x 48,000)	1,596,000
Mail-order contribution [$25 x (80,000 – 48,000)]	800,000
Less: Total fixed cost	(2,228,500)
Net profit	167,500

As profit is higher under alternative A, alternative A should be recommended.

(d) risk in collecting debt from overseas

unavoidable / avoidable cost elements in calculating profits

(e)

	Hire
	$
Rental cost	125,000
Saving for Direct labour cost ($320,000 / 80,000 x 76,000 x 40%)	(121,600)
Additional cost for hiring the equipment	3,400

Since the cost for hiring is increasing by $3,400, the company should not hire the equipment.

(e)

	Not Hire		Hire
	$		$
Contribution	2,150,800		2,272,400
Less Fixed cost	1,981,000		1,981,000
Rental cost	–		125,000
Net profit	169,800		166,400

Contribution for hiring the equipment = 2,150,800 + $320,000 / 80,000 x 76,000 x 40% = $2,272,400

Since the net profit for hiring is decreased by $3,400, the company should not hire the equipment.