GLOBAL EDITION

Weygand's MANAGERIAL ACCOUNTING TOOLS FOR BUSINESS DECISION MAKING

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Incremental Analysis

Learning Objectives

- Describe management's decision-making process and incremental analysis.
- Analyze the relevant costs in accepting an order at a special price.
- 7.3 Analyze the relevant costs in a make-or-buy decision.
- Analyze the relevant costs in determining whether to sell or process materials further.
- Analyze the relevant costs to be considered in repairing, retaining, or replacing equipment.
- Analyze the relevant costs in deciding whether to eliminate an unprofitable segment or product.



Describe management's decision-making process and incremental analysis.

Making decisions is an important management function.

- Does not always follow a set pattern.
- Decisions vary in scope, urgency, and importance.
- Steps usually involved in process include:

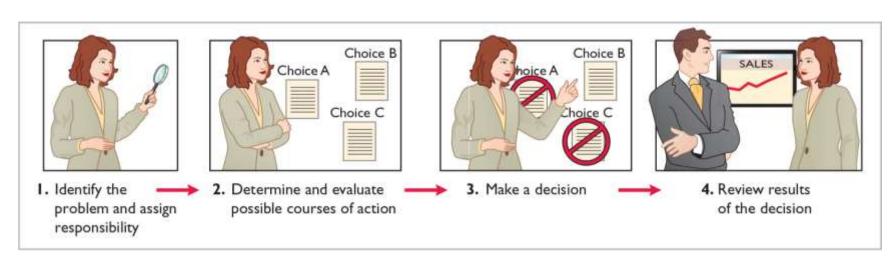


Illustration 7-1
Management's decision-making process

Decision-Making Process

In making business decisions,

- Considers both financial and non-financial information.
- Financial information
 - Revenues and costs, and
 - Effect on overall profitability.
- Non-financial information
 - Effect on employee turnover
 - The environment
 - Overall company image.

7-4 *LO*

Incremental Analysis Approach

- Decisions involve a choice among alternative actions.
- Process used to identify the financial data that change under alternative courses of action.
 - Both costs and revenues may vary or
 - Only revenues may vary or
 - Only costs may vary

Alternative Terminology

Incremental analysis is also called *differential analysis* because the analysis focuses on differences.

7-5 *LO* 7

How Incremental Analysis Works

Illustration 7-2Basic approach in incremental analysis

-	7 - (4 -) =	Incremental Anal	ysis.xls	
	Home Insert Page Layout Formula	s Data Review View		
	P18			
	A	В	С	D
1		Alternative A	Alternative B	Net Income Increase (Decrease)
2	Revenues	€125,000	€110,000	€ (15,000)
3	Costs	100,000	80,000	20,000
4	Net income	€ 25,000	€ 30,000	€ 5,000
5				

- Incremental revenue is €15,000 less under Alternative B.
- Incremental cost savings of €20,000 is realized.
- ◆ Alternative B produces €5,000 more net income.

7-6 *LO* 7

How Incremental Analysis Works

Important concepts used in incremental analysis:

- Relevant cost.
- Opportunity cost.
- Sunk cost.

7-7 *LO 1*

How Incremental Analysis Works

- Sometimes involves changes that seem contrary to intuition.
- Variable costs sometimes do not change under alternatives.
- Fixed costs sometimes change between alternatives.

7-8 *LO 1*

Types of Incremental Analysis

Common types of decisions involving incremental analysis:

- 1. Accept an order at a special price.
- 2. Make or buy component parts or finished products.
- 3. Sell products or process them further.
- 4. Repair, retain, or replace equipment.
- 5. Eliminate an unprofitable business segment or product.

7-9

Incremental Analysis

Question

Incremental analysis is the process of identifying the financial data that:



- a. Do not change under alternative courses of action.
- b. Change under alternative courses of action.
- c. Are mixed under alternative courses of action.
- d. No correct answer is given.

7-10 *LO*

People, Planet, and Profit Insight



Joseph Clark/ Digital Vision/GettyImages

Water: Liquid Gold of the Future

Currently, finding ground water in some places is becoming cost prohibitive. Because of this, some companies and governments are banking on

desalination. In some areas, it is thought that these desalination plants may provide more than 10% of the fresh water that is needed by 2020 to sustain life and growth around the world But at what cost?

Some view the expensive desalination process as an investment that can be written off as a sunk cost in the future. As with any new technology, supporters believe that the costs will come down, modularity of the plants will occur, and new cost-effective membrane processes will be developed.

During the drought period from 1997 to 2009, Australia invested in the sunk-cost line of thinking. When rain levels hit

record lows, roughly \$11 billion was funneled into desalination. The Australian government also began a reframing of peoples' thinking about the drought, calling it a policy issue rather than a natural disaster. In the case of Australia, water experts believe that individuals learned and applied water innovations, such as adopting "greywater" measures that use dishwater or water from laundry machines to water lawns along with the use of the desalination. The result? An average Melbourne resident uses just 25% of the water used by a person in Los Angeles.

Sources: M. Jackson, "Can Lessons from Australia's 'Big Dry' Save California?" The Christian Science Monitor (December 1, 2015); and L. Williams, "Desalination Is No Longer a Pipe Dream in Southern California," Los Angeles Daily News (January 22, 2017).

Should sunk costs be treated as relevant costs when applying incremental analysis? (Go to the book's companion website for this answer and additional questions.)

7-11 *LO 1*

7.1

Incremental Analysis

Oong Ltd. is comparing two different options. The company currently follows Option 1, with revenues of NT\$2,400,000 per year, maintenance expenses of NT\$150,000 per year, and operating expenses of NT\$1,140,000 per year. Option 2 provides revenues of NT\$2,400,000 per year, maintenance expenses of NT\$360,000 per year, and operating expenses of NT\$960,000 per year. Option 1 employs a piece of equipment that was upgraded 2 years ago at a cost of NT\$660,000. If Option 2 is chosen, it will free up resources that will increase revenues by NT\$90,000.

Complete the following table to show the change in income from choosing Option 2 versus Option 1. Designate any sunk costs with an "S."

LO 1

The company currently follows Option 1, with revenues of NT\$2,400,000 per year, maintenance expenses of NT\$150,000 per year, and operating expenses of NT\$1,140,000 per year. Option 2 provides revenues of NT\$2,400,000 per year, maintenance expenses of NT\$360,000 per year, and operating expenses of NT\$960,000 per year. Option 1 employs a piece of equipment that was upgraded 2 years ago at a cost of NT\$660,000. If Option 2 is chosen, it will free up resources that will increase revenues by NT\$90,000.

	Option 1	Option 2	Net Income Increase (Decrease)	Sunk (S)
Revenues				
Maintenance expenses				
Operating expenses				
Equipment upgrade				
Opportunity cost				
70.00°			31	



Analyze the relevant costs in accepting an order at a special price.

Accept an Order at a Special Price

- Obtain additional business by making a major price concession to a specific customer.
- Assumes that sales of products in other markets are not affected by special order.
- Assumes that company is not operating at full capacity.

LO 2

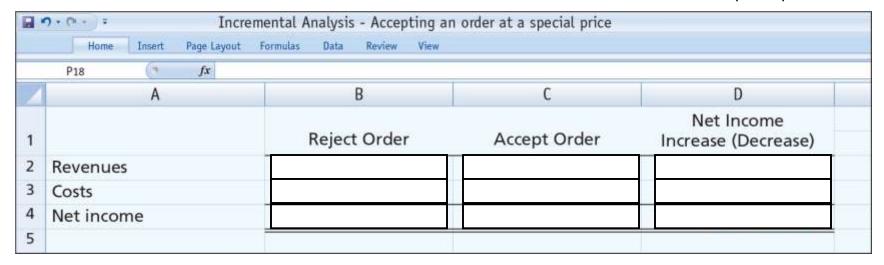
Accept an Order at a Special Price

Illustration: Sunbelt Ltd. produces 100,000 Smoothie blenders per month, which is 80% of plant capacity. Variable manufacturing costs are Rs560 per unit. Fixed manufacturing costs are Rs28,000,000, or Rs280 per unit. The blenders are normally sold directly to retailers at Rs1,400 each. Sunbelt has an offer from Kensington Ltd. (a foreign wholesaler) to purchase an additional 2,000 blenders at Rs770 per unit. Acceptance of the offer would not affect normal sales of the product, and the additional units can be manufactured without increasing plant capacity. What should management do?

7-15 *LO* 2

Accept an Order at a Special Price

Illustration 7-4
Incremental analysis—accepting an order at a special price



- Fixed costs do not change since within existing capacity thus fixed costs are not relevant.
- Variable manufacturing costs and expected revenues change thus both are relevant to the decision.

7-16 LO 2

7.2

Special Orders

Ronaldo SA incurs costs of R\$28 per unit (R\$18 variable and R\$10 fixed) to make a product that normally sells for R\$42. A foreign wholesaler offers to buy 5,000 units at R\$25 each. Ronaldo will incur additional shipping costs of R\$1 per unit. Compute the increase or decrease in net income Ronaldo will realize by accepting the special order, assuming Ronaldo has excess operating capacity. Should Ronaldo accept the special order?

			Net Income
	Reject	Accept	Increase (Decrease)
Revenues			
Costs			Accept
Net income			or
Tet meome			Reject?

 $^{**(5,000 \}times R$18) + (5,000 \times R$1)$



Analyze the relevant costs in a make-or-buy decision.

Illustration: Rhee Ltd. Illustration 7-5 presents the annual costs in producing 25,000 ignition switches for scooters.

Total cost per unit (₩225,000,000 ÷ 25,000)	₩9,000
Total manufacturing costs	₩225,000,000
Fixed manufacturing overhead	60,000,000
Variable manufacturing overhead	40,000,000
Direct labor	75,000,000
Direct materials	₩ 50,000,000

Illustration 7-5
Annual product cost data

Instead of making its own switches, Rhee might purchase the ignition switches at a price of ₩8,000 per unit. "What should management do?"

7-18 *LO3*

Make or Buy Decision

Illustration 7-6 Incremental analysis make or buy

3	ncreme Increme	ental Analysis - Make or buy		
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	P18			
Z	A	В	C	D
1		Make	Buy	Net Income Increase (Decrease)
2	Direct materials	₩ 50,000,000		
3	Direct labor	75,000,000		
4	Variable manufacturing costs	40,000,000		
5	Fixed manufacturing costs	60,000,000		
6	Purchase price (25,000 × ₩8,000)	0		
7	Total annual cost	₩225,000,000		
8				

- ◆ Total manufacturing cost is ₩1,000 higher per unit than purchase price.
- ♦ Must absorb at least ₩50,000,000 of fixed costs under either option.

LO 3

Opportunity Cost

The **potential benefit** that may be obtained from following an alternative course of action.

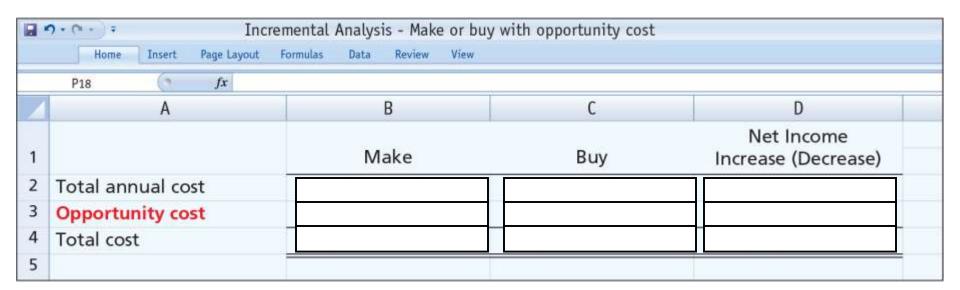
ETHICS NOTE

In the make-or-buy decision, it is important for management to take into account the social impact of its choice. For instance, buying may be the most economically feasible solution, but such action could result in the closure of a manufacturing plant that employs many good workers.

7-20 LO 3

Opportunity Cost

Illustration: Assume that through buying the switches, Rhee Ltd. can use the released productive capacity to generate additional income of ₩38,000,000 from producing a different product. This lost income is an additional cost of continuing to make the switches in the make-or-buy decision.



Make or Buy Decision

Question

In a make-or-buy decision, relevant costs are:

- a. Manufacturing costs that will be saved.
- b. The purchase price of the units.
- c. The opportunity costs.



d. All of the above.

7-22

Service Company Insight Amazon.com



iStockphoto

Giving Away the Store?

Some analysts have questioned whether some of the methods that **Amazon.com** (USA) uses to increase its sales make good business sense. For example, a few years ago, Amazon initiated a "Prime" free-shipping subscription program. For a \$79 fee per year, Amazon's customers get free shipping on as many goods as they want to buy. At the time,

CEO Jeff Bezos promised that the program would be costly in the short-term but benefit the company in the long-term. Six years later, it was true that Amazon's sales had grown considerably. It was also estimated that its Prime customers buy two to three times as much as non-Prime customers. But, its shipping costs rose from 2.8% of sales to 4% of sales, which is remarkably similar to the drop in its gross margin from 24% to 22.3%. Perhaps even less easy to justify is a proposal by Mr. Bezos to start providing a free Internet movie-streaming service to Amazon's Prime customers. Perhaps some incremental analysis is in order?

Source: Martin Peers, "Amazon's Prime Numbers," Wall Street Journal Online (February 3, 2011).

What are the relevant revenues and costs that Amazon should consider relative to the decision whether to offer the Prime free-shipping subscription? (Go to the book's companion website for this answer and additional questions.)

7-23 LO 3

7.3

Make or Buy

Juanita SA must decide whether to make or buy some of its components for the appliances it produces. The costs of producing 166,000 electrical cords for its appliances are as follows.

Direct materials €90,000 Varia	ble overhead €32,000
--------------------------------	----------------------

Direct labor €20,000 Fixed overhead €24,000

Instead of making the electrical cords at an average cost per unit of €1.00 (€166,000 ÷ 166,000), the company has an opportunity to buy the cords at €0.90 per unit. If the company purchases the cords, all variable costs and one-fourth of the fixed costs are eliminated.

(a) Prepare an incremental analysis showing whether the company should make or buy the electrical cords. (b) Will your answer be different if the released productive capacity will generate additional income of €5,000?

7.3

Make or Buy

(a) Prepare an incremental analysis showing whether the company should make or buy the electrical cords.

	Make	Buy	Net Income Increase (Decrease)
Direct materials	€ 90,000		
Direct labor	20,000		
Variable manufacturing costs	32,000		
Fixed manufacturing costs	24,000		
Purchase price	_0_	<u> </u>	
Total cost	€166,000		

^{*€24,000 × .75}

Juanita will incur cords rather than making them.

if it buys the electrical

^{**166,000 × €0.90}

7.3

Make or Buy

(b) Will your answer be different if the released productive capacity will generate additional income of €5,000?

			Net Income
	Make	Buy	Increase (Decrease)
Total cost	€166,000		
Opportunity cost	5,000		
Total cost	<u>€171,000</u>		

Yes, net income will be electrical cords rather than making them.

if Juanita purchases the



Analyze the relevant costs in determining whether to sell or process materials further.

Sell or Process Further

 May have option to sell product at a given point in production or to process further and sell at a higher price.

Decision Rule:

Process further as long as the incremental **revenue** from such processing **exceeds** the incremental processing **costs**.

LO 4

Single-Product Case

Illustration: Woodmasters Ltd. makes tables. The cost to manufacture an unfinished table is HK\$350. The selling price per unfinished unit is HK\$500. Woodmasters has unused capacity that can be used to finish the tables and sell them at HK\$600 per unit. For a finished table, direct materials will increase HK\$20 and direct labor costs will increase HK\$40. Variable manufacturing overhead costs will increase by HK\$24 (60% of direct labor). No increase is anticipated in fixed manufacturing overhead.

Illustration 7-8
Per unit cost of unfinished table

HK\$150
100
60
40
HK\$350

Single-Product Case

The incremental analysis on a per unit basis is shown in Illustration 7-9 (see Helpful Hint).

a	Increme	ntal Analysis - Sell or pr	ocess further	
	Home Insert Page Layout Formulas Data Rev	riew View		
	P18			
	A	В	С	D
1		Sell Unfinished	Process Further	Net Income Increase (Decrease)
2	Sales price per unit	HK\$500	· · · · · · · · · · · · · · · · · · ·	
3	Cost per unit			
4	Direct materials	150	0.10.10	
5	Direct labor	100		
6	Variable manufacturing overhead	60		
7	Fixed manufacturing overhead	40		
8	Total	350		
9	Net income per unit	HK\$150		
10				
11	a150 + 20; b100 + 40; c60 + 24			
12				

Illustration 7-9
Incremental analysis—
sell or process further

Should Woodmasters sell or process further?

Joint product situation for Marais Creamery. Cream and skim milk are products that result from the processing of raw milk.

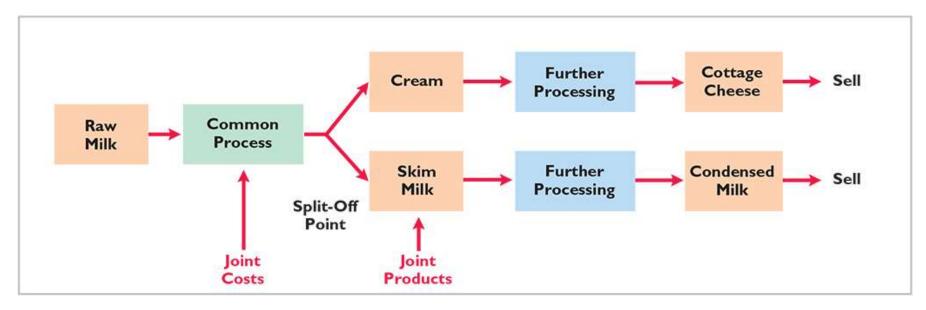


Illustration 7-10
Joint production
process—Creamery

Joint product costs are **sunk costs** and thus not relevant to the sell-or-process further decision.

7-30 *LO 4*

Cost and revenue data per day for cream.

Illustration 7-11
Cost and revenue data per day for cream

Costs (per day)	
Joint cost allocated to cream	€ 9,000
Cost to process cream into cottage cheese	10,000
Revenues from Products (per day)	
Cream	€19,000
Cottage cheese	27,000

Determine whether the company should simply sell the cream or process it further into cottage cheese.

7-31 *LO* 4

Analysis of whether to sell cream or process into cottage cheese.

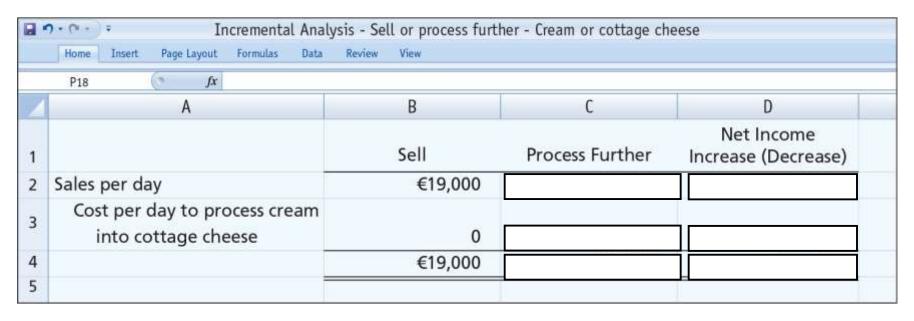


Illustration 7-12

Marais should or should not process the cream further?

7-32 *LO* 4

Cost and revenue data per day for skim milk.

Illustration 7-13

Costs (per day)	
Joint cost allocated to skim milk	€ 5,000
Cost to process skim milk into condensed milk	8,000
Revenues from Products (per day)	
Skim milk	€11,000
Condensed milk	26,000

Determine whether the company should sell the skim milk or process it further into condensed milk.

7-33 *LO* 4

Analysis of whether to sell skim milk or process into condensed milk.

Illustration 7-14

d ') - (2 -) =	I	ncremental Analys	sis - Sell or process further -	Skim milk or condensed	milk
	Home Inse	ert Page Layout	Formulas Data	Review View		
	P18	fx fx				
		A		В	С	D
1				Sell	Process Further	Net Income Increase (Decrease)
2	Sales per day		€11,000	100000000000000000000000000000000000000	, Selective is a selective of the select	
3	Cost per day to process skim milk into condensed milk		0			
4				€11,000		1
5						-

Marais should or should not process the milk further?

7-34 *LO 4*

Sell or Process Further

Question

The decision rule is a sell-or-process-further decision:

Process further as long as the incremental revenue from processing exceeds:



- a. Incremental processing costs.
- b. Variable processing costs.
- c. Fixed processing costs.
- d. No correct answer is given.

LO 4

7.4

Sell or Process Further

Easy Does It manufactures unpainted furniture for the do-it-yourself (DIY) market. It currently sells a child's rocking chair for ¥250. Production costs are ¥120 variable and ¥80 fixed. Easy Does It is considering painting the rocking chair and selling it for ¥350. Variable costs to paint each chair are expected to be ¥90, and fixed costs are expected to be ¥20.

Prepare an analysis showing whether Easy Does It should sell unpainted or painted chairs.

Solution	Sell	Process Further	Net Income Increase (Decrease)
Revenues Variable costs			
Fixed costs	-		
Net income	· · · · · · · · · · · · · · · · · · ·		

 a ¥120 + ¥90 b ¥80 + ¥20



Analyze the relevant costs to be considered in repairing, retaining, or replacing equipment.

Illustration: Yamamoto Group is considering replacing a factory machine with a new machine. Yamamoto Group has a factory machine that originally cost ¥11,000,000. It has a balance in Accumulated Depreciation of ¥7,000,000, so its book value is ¥4,000,000. It has a remaining useful life of four years. The company is considering replacing this machine with a new machine. A new machine is available that costs ¥12,000,000. It is expected to have zero residual value at the end of its four-year useful life. If the new machine is acquired, variable manufacturing costs are expected to decrease from \(\pm\)16,000,000 to \(\pm\)12,500,000 and the old unit could be sold for ¥500,000. The incremental analysis for the four-year period is as follows.

LO 5

Repair, Retain, or Replace Equipment

Prepare the incremental analysis for the **four-year period**.

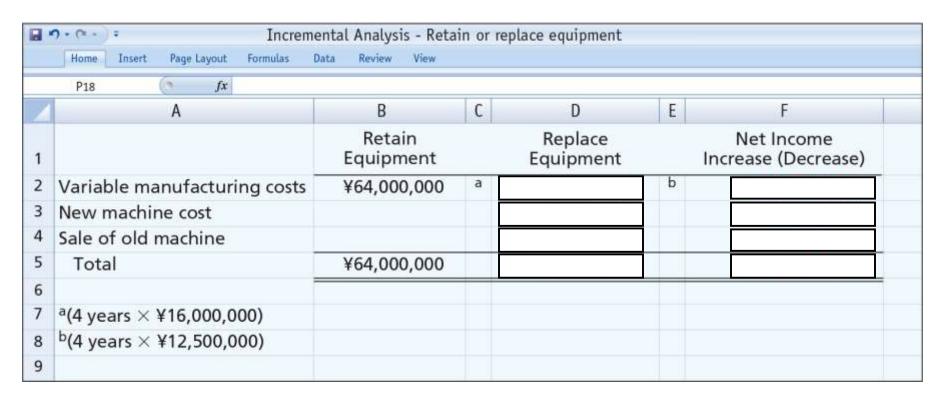


Illustration 7-15

Retain or Replace?

Repair, Retain, or Replace Equipment

Additional Considerations

- The book value of old machine does not affect the decision.
 - Book value is a sunk cost.
 - Costs which cannot be changed by future decisions (sunk cost) are not relevant in incremental analysis.
- However, any trade-in allowance or cash disposal value of the existing asset is relevant.

7-39

DO IT!

7.5

Repair or Replace Equipment

Rochester Roofing Ltd. is faced with a decision. The company relies very heavily on the use of its 20-meter extension lift for work on large homes and commercial properties. Last year, the company spent £60,000 refurbishing the lift. It has just determined that another £40,000 of repair work is required. Alternatively, Rochester Roofing has found a newer used lift that is for sale for £170,000. The company estimates that both the old and new lifts would have useful lives of 6 years. However, the new lift is more efficient and thus would reduce operating expenses by about £25,000 per year. The company could also rent out the new lift for about £2,000 per year. The old lift is not suitable for rental. The old lift could currently be sold for £25,000 if the new lift is purchased. **Prepare** an incremental analysis that shows whether the company should repair or replace the equipment.

LO 5

DO IT!

7.5

Repair or Replace Equipment

Solution

	Retain Equipment	Replace Equipment	Net Income Increase (Decrease)
Operating expenses	£150,000*		
Repair costs	40,000		
Rental revenue			
New machine cost			
Sale of old machine	2 <u></u> 2		
Total cost	£190,000		
* $(6 \text{ years} \times £25,000)$	· 	. 	-
** $(6 \text{ years} \times £2,000)$			

The analysis indicates that purchasing the new machine would increase net income for the 6-year period by £57,000.



Analyze the relevant costs in deciding whether to eliminate an unprofitable segment or product.

- Key: Focus on Relevant Costs.
- Consider effect on related product lines.
- Fixed costs allocated to the unprofitable segment must be absorbed by the other segments.
- Net income may decrease when an unprofitable segment is eliminated.
- Decision Rule: Retain the segment unless fixed costs eliminated exceed contribution margin lost.

Illustration: Venus sports manufactures three models of tennis rackets:

Profitable lines: Pro and Master

Unprofitable line: Champ

Should Champ be eliminated?

	Pro	Master	Champ	Total
Sales	€800,000	€300,000	€100,000	€1,200,000
Variable costs	520,000	210,000	90,000	820,000
Contribution margin	280,000	90,000	10,000	380,000
Fixed costs	80,000	50,000	30,000	160,000
Net income	€200,000	€ 40,000	€ (20,000)	€ 220,000

Prepare income data after eliminating Champ product line. Assume fixed costs are allocated 2/3 to Pro and 1/3 to Master.

	Pro	Master	Total
Sales	€800,000	€300,000	€1,100,000
Variable costs	520,000	210,000	730,000
Contribution margin Fixed costs	280,000	90,000	370,000
Net income			

Illustration 7-17
Income data after eliminating unprofitable product line

Total income is decreased by

Incremental analysis of Champ provided the same results:

Do Not Eliminate Champ

Illustration 7-18
Incremental analysis—eliminating unprofitable segment with no reduction in fixed costs

	nci	emental Analysis - Eliminating	an unprofitable segment	
	Home Insert Page Layout Formulas	Data Review View		
	P18			
	Α	В	C	D
1		Continue	Eliminate	Net Income Increase (Decrease)
2	Sales	€100,000	€ 0	€(100,000)
3	Variable costs	90,000	0	90,000
4	Contribution margin	10,000	0	(10,000)
5	Fixed costs	30,000	30,000	0
6	Net income	€(20,000)	€(30,000)	€ (10,000)
7		(r		

7-45 *LO* 6

Assume that €22,000 of the fixed costs attributed to the Champ line can be eliminated if the line is discontinued.

Eliminate Champ

Illustration 7-19
Incremental analysis—eliminating unprofitable segment with reduction in fixed costs

	n · · · · · · · · · In	cremental Analysis - Eliminating	an unprofitable segment	
	Home Insert Page Layout Formula	as Data Review View		
	P18			
	A	В	C	D
1		Continue	Eliminate	Net Income Increase (Decrease)
2	Sales	€100,000	€ 0	€(100,000)
3	Variable costs	90,000	0	90,000
4	Contribution margin	10,000	0	(10,000)
5	Fixed costs	30,000	8,000	22,000
6	Net income	€(20,000)	€(8,000)	€ 12,000
7				

7-46 *LO*

Incremental Analysis

Question

If an unprofitable segment is eliminated:

- a. Net income will always increase.
- b. Variable costs of the eliminated segment will have to be absorbed by other segments.



- c. Fixed costs allocated to the eliminated segment will have to be absorbed by other segments.
- d. Net income will always decrease.

LO 6

Management Insight Buck Knives



Max Blain/iStockphoto

Time to Move to a New Neighborhood?

If you have ever moved, then you know how complicated and costly it can be. Now consider what it would be like for a manufacturing company with 260 employees and a 170,000-square-foot facility to move from southern California to Idaho. That is what Buck Knives (USA) did in order to save its company from financial ruin. Electricity rates in Idaho were half those in California, workers' compensation was one-third the cost, and factory

wages were 20% lower. Combined, this would reduce manufacturing costs by \$600,000 per year. Moving the factory would cost about \$8.5 million, plus \$4 million to move key employees. Offsetting these costs was the estimated \$11 million selling price of the California property. Based on these estimates, the move would pay for itself in three years.

Ultimately, the company received only \$7.5 million for its California property, only 58 of 75 key employees were willing to move, construction was delayed by a year which caused the new plant to increase in price by \$1.5 million, and wages surged in Idaho due to low unemployment. Despite all of these complications, though, the company considers the move a great success.

Source: Chris Lydgate, "The Buck Stopped," Inc. Magazine (May 2006), pp. 87–95.

What were some of the factors that complicated the company's decision to move? How should the company have incorporated such factors into its incremental analysis? (Go to the book's companion website for this answer and additional questions.)

7-48 *LO* 6

DO IT!

7.6

Unprofitable Segments

Lambert AG manufactures several types of accessories. For the year, the knit hats and scarves line had sales of €400,000, variable expenses of €310,000, and fixed expenses of €120,000. Therefore, the knit hats and scarves line had a net loss of €30,000. If Lambert eliminates the knit hats and scarves line, €20,000 of fixed costs will remain. Prepare an analysis showing whether the company should eliminate the knit hats and scarves line.

	Continue	Eliminate	Net Income Increase (Decrease)
Sales	€ 400,000		
Variable costs	310,000		
Contribution margin	90,000		
Fixed costs	120,000	(
Net income	€ (30,000)	" <u> </u>	

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