

# Chapter 5

Relevant Costs for Decision Making

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- Define relevant costs, opportunity costs, and sunk costs,
- Explain the above costs in the context of decision making.
- Consider the various business decisions in:
  - (a) acceptance of special order;
  - (b) add or drop a product line or segment;
  - (c) make or buy decision; and
  - (d) further processing decision.

# SUMMARY

# SUMMARY

- A relevant cost is a cost that differs in total between the alternatives in a decision. Relevant costing attempts to determine the objective cost of a business decision. An objective measure of the cost of a business decision is the extent of cash outflows that shall result from its implementation. Relevant costing focuses on just that and ignores other costs which do not affect the future cash flows. Relevant costing is just a refined application of such basic principles to business decisions. The key to relevant costing is the ability to filter what is and isn't relevant to a business decision.

# SUMMARY

- Unlike other types of cost, opportunity cost does not require the payment of cash or its equivalent. It is a potential benefit or income that is given up as a result of selecting an alternative over another. For example, You have a job in a company that pays you \$25,000 per year. For a better future, you want to get a Master's degree but cannot continue your job while studying. If you decide to give up your job and return to school to earn a Master's degree, you would not receive \$25,000. Your opportunity cost would be \$25,000.
- Almost every alternative has an opportunity cost. It is not entered in the accounting records but must be considered while making decisions.

# SUMMARY

- The costs that have already been incurred and cannot be changed by any decision are known as sunk costs. For example, a company purchased a machine several years ago. Due to change in fashion in several years, the products produced by the machine cannot be sold to customers. Therefore the machine is now useless or obsolete. The price originally paid to purchase the machine cannot be recovered by any action and is therefore a sunk cost.
- These costs should not be taken into account while making any decision because no action can reverse them.

# SUMMARY

- Decisions made to add or drop product lines are based on the impact that products have on operating income. When managers consider dropping a product line, they look to determine what costs they can avoid by doing so. If the costs avoided from dropping a product line are greater than that product's contribution margin, net operating income will increase by dropping the line.
- Similarly, if a new product line will have a contribution margin that is greater than any new fixed costs incurred, adding a new product line will increase the business's operating income.

# SUMMARY

- Contribution margin represents the incremental profit generated for each product/unit sold and is computed as the selling price per unit minus the variable cost per unit. Also called as dollar contribution per unit, the measure indicates how a particular product contributes to the overall profit of the company. It represents an alternate way to represent the profitability potential of a particular product offered by a company, and is the portion of sales that helps to offset fixed costs.

# SUMMARY

Applications of differential analysis are:

- setting prices of products;
- accepting or rejecting special orders;
- adding or eliminating products, segments, or customers;
- processing or selling joint products; and
- deciding whether to make products or buy them.

Although these five decisions are not the only applications of differential analysis, they represent typical short-term business decisions using differential analysis. Our discussion ignores income taxes.

# SUMMARY

Pricing Decisions - When applying differential analysis to pricing decisions, each possible price for a given product represents an alternative course of action. The sales revenues for each alternative and the costs that differ between alternatives are the relevant amounts in these decisions. Total fixed costs often remain the same between pricing alternatives and, if so, may be ignored. In selecting a price for a product, the goal is to select the price at which total future revenues exceed total future costs by the greatest amount, thus maximizing income.

# SUMMARY

The product may have many substitutes. If a company sets a high price, the number of units sold may decline substantially as customers switch to lower-priced competitive products. Thus, in the maximization of income, the expected volume of sales at each price is as important as the contribution margin per unit of product sold. In making any pricing decision, management should seek the combination of price and volume that produces the largest total contribution margin. This combination is often difficult to identify in an actual situation because management may have to estimate the number of units that can be sold at each price.

## Section 1

DEFINE RELEVANT COSTS,  
OPPORTUNITY COSTS, AND SUNK  
COSTS

# COST CONCEPTS FOR DECISION MAKING

- Relevant costs are those costs that **will make a difference in a decision.** Relevant costs are **future costs** that will differ among alternatives.
- A relevant cost is a cost that differs between alternatives.



# COST CONCEPTS FOR DECISION MAKING

- A company is deciding whether or not to eliminate a product line. The product line accounts for approximately 4% of the company's activities. If the product line is eliminated, the officers of the corporation will continue to receive the same salaries and the central office expenses will not change. The product line managers and other employees working directly on the product line will be terminated. Hence, their salaries will be eliminated.
- A relevant cost is a cost that differs between alternatives.



# COST CONCEPTS FOR DECISION MAKING

- The salaries of the product line managers and other employees whose salaries will be eliminated are relevant to the decision. If these salaries are \$700,000 with the product line and \$0 without the product line, the \$700,000 of savings is relevant. Those cost savings and other possible cost savings will be considered along with the loss of sales revenues.
- A relevant cost is a cost that differs between alternatives.



# COST CONCEPTS FOR DECISION MAKING

- On the other hand, the officers' salaries are not relevant in the decision. In other words, it doesn't matter if the officers' salaries are \$500,000 or \$5,000,000. The officers' salaries will be the same with or without the product line. Similarly, the decision maker does not need to know the amount of its central office expenses, since they will be the same with or without the product line. Expenses from previous years are also irrelevant.
- A relevant cost is a cost that differs between alternatives.



# IDENTIFYING RELEVANT COSTS

Costs that can be eliminated (in whole or in part) by choosing one alternative over another are avoidable costs. **Avoidable costs are relevant costs.**

Unavoidable costs are never relevant and include:

- ① Sunk costs.
- ② Future costs that do not differ between the alternatives.

# IDENTIFYING RELEVANT COSTS

Cynthia, a Boston student, is considering visiting her friend in New York. She can drive or take the train. By car it is 230 miles to her friend's apartment. She is trying to decide which alternative is less expensive and has gathered the following information:

Automobile Costs (based on 10,000 miles driven per year)		
	Annual Cost of Fixed Items	Cost per Mile
1 Annual straight-line depreciation on car	\$ 2,800	\$ 0.280
2 Cost of gasoline		0.050
3 Annual cost of auto insurance and license	1,380	0.138
4 Maintenance and repairs		0.065
5 Parking fees at school		0.036
6 Total average cost		\$ 0.569

$\$45 \text{ per month} \times 8 \text{ months}$

$\$1.60 \text{ per gallon} \div 32 \text{ MPG}$

$\$18,000 \text{ cost} - \$4,000 \text{ salvage value} \div 5 \text{ years}$

# IDENTIFYING RELEVANT COSTS

## Automobile Costs (based on 10,000 miles driven per year)

	Annual Cost of Fixed Items	Cost per Mile
1 Annual straight-line depreciation on car	\$ 2,800	\$ 0.280
2 Cost of gasoline		0.050
3 Annual cost of auto insurance and license	1,380	0.138
4 Maintenance and repairs		0.065
5 Parking fees at school	360	0.036
6 Total average cost		<u>\$ 0.569</u>

## Some Additional Information

7 Reduction in resale value of car per mile of wear	\$ 0.026
8 Round-trip train fare	\$ 104
9 Benefits of relaxing on train trip	????
10 Cost of putting dog in kennel while gond	\$ 40
11 Benefit of having car in New York	????
12 Hassle of parking car in New York	????
13 Per day cost of parking car in New York	\$ 25

# IDENTIFYING RELEVANT COSTS

Which costs and benefits are relevant in Cynthia's decision?

The cost of the car is a sunk cost and is not relevant to the current decision.

The annual cost of insurance is not relevant. It will remain the same if she drives or takes the train.

However, the cost of gasoline is clearly relevant if she decides to drive. If she takes the drive the cost would now be incurred, so it varies depending on the decision.

# IDENTIFYING RELEVANT COSTS

Which costs and benefits are relevant in Cynthia's decision?

The cost of maintenance and repairs is relevant. In the long-run these costs depend upon miles driven.

The monthly school parking fee is not relevant because it must be paid if Cynthia drives or takes the train.

At this point, we can see that some of the average cost of \$0.569 per mile are relevant and others are not.

# IDENTIFYING RELEVANT COSTS

Which costs and benefits are relevant in Cynthia's decision?

The decline in resale value due to additional miles is a relevant cost.

The round-trip train fare is clearly relevant. If she drives the cost can be avoided.

Relaxing on the train is relevant even though it is difficult to assign a dollar value to the benefit.

The kennel cost is not relevant because Cynthia will incur the cost if she drives or takes the train.

# IDENTIFYING RELEVANT COSTS

Which costs and benefits are relevant in Cynthia's decision?

The cost of parking is relevant because it can be avoided if she takes the train.

The benefits of having a car in New York and the problems of finding a parking space are both relevant but are difficult to assign a dollar amount.

# IDENTIFYING RELEVANT COSTS

From a financial standpoint, Cynthia would be better off taking the train to visit her friend. Some of the non-financial factor may influence her final decision.

Relevant Financial Cost of Driving	
Gasoline (460 @ \$0.050 per mile)	\$ 23.00
Maintenance (460 @ \$0.065 per mile)	29.90
Reduction in resale (460 @ \$0.026 per mile)	11.96
Parking in New York (2 days @ \$25 per day)	50.00
<b>Total</b>	<b>\$ 114.86</b>

Relevant Financial Cost of Taking the Train	
Round-trip ticket	\$ 104.00

# TOTAL AND DIFFERENTIAL COST APPROACHES

The management of a company is considering a new laborsaving machine that rents for \$3,000 per year. Data about the company's annual sales and costs with and without the new machine are:

	Current Situation	Situation With New Machine	Differential Costs and Benefits
<b>Sales (5,000 units @ \$40 per unit)</b>	<b>\$ 200,000</b>	<b>\$ 200,000</b>	<b>-</b>
<b>Less variable expenses:</b>			
Direct materials (5,000 units @ \$14 per unit)	70,000	70,000	-
Direct labor (5,000 units @ \$8 and \$5 per unit)	40,000	25,000	15,000
Variable overhead (5,000 units @ \$2 per unit)	10,000	10,000	-
<b>Total variable expenses</b>	<b>120,000</b>	<b>105,000</b>	<b>-</b>
<b>Contribution margin</b>	<b>80,000</b>	<b>95,000</b>	<b>15,000</b>
<b>Less fixed expense:</b>			
Other	62,000	62,000	-
Rent on new machine	-	3,000	(3,000)
<b>Total fixed expenses</b>	<b>62,000</b>	<b>65,000</b>	<b>(3,000)</b>
<b>Net operating income</b>	<b>\$ 18,000</b>	<b>\$ 30,000</b>	<b>12,000</b>

# TOTAL AND DIFFERENTIAL COST APPROACHES

As you see, the only costs that differ between the alternatives are the direct labor costs savings and the increase in fixed rental costs.

	Current Situation	Situation With New Machine	Differential Costs and Benefits
<b>Sales (5,000 units @ \$40 per unit)</b>	\$ 200,000	\$ 200,000	-
<b>Less variable expenses:</b>			

We can efficiently analyze the decision by looking at the different costs and revenues and arrive at the same solution.

## Net Advantage to Renting the New Machine

Decrease in direct labor costs (5,000 units @ \$3 per unit)	\$ 15,000
Increase in fixed rental expenses	(3,000)
<b>Net annual cost saving from renting the new machine</b>	<b>\$ 12,000</b>

## Section 2

EXPLAIN THE ABOVE COSTS IN THE CONTEXT OF DECISION MAKING

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EXPLAIN THE ABOVE COSTS IN THE  
CONTEXT OF DECISION MAKING

# ADDING/DROPPING SEGMENTS

As a rule, product lines or business segments should be evaluated based on **traceable revenues and costs**. Allocated fixed costs should be removed from the analysis of income since the company will incur in the entire amount with or without the product line or segment. One of the most important decisions managers make is whether to add or drop a business segment such as a product or a store.

**Let's see how relevant costs should be used in this decision.**



# ADDING/DROPPING SEGMENTS

Due to the declining popularity of digital watches, Lovell Company's digital watch line has not reported a profit for several years. An income statement for last year is shown on the next screen.



# ADDING/DROPPING SEGMENTS

## Segment Income Statement Digital Watches

<b>Sales</b>		<b>\$ 500,000</b>
<b>Less: variable expenses</b>		
<b>Variable manufacturing costs</b>	<b>\$ 120,000</b>	
<b>Variable shipping costs</b>	<b>5,000</b>	
<b>Commissions</b>	<b>75,000</b>	<b>200,000</b>
<b>Contribution margin</b>		<b>\$ 300,000</b>
<b>Less: fixed expenses</b>		
<b>General factory overhead</b>	<b>\$ 60,000</b>	
<b>Salary of line manager</b>	<b>90,000</b>	
<b>Depreciation of equipment</b>	<b>50,000</b>	
<b>Advertising - direct</b>	<b>100,000</b>	
<b>Rent - factory space</b>	<b>70,000</b>	
<b>General admin. expenses</b>	<b>30,000</b>	<b>400,000</b>
<b>Net operating loss</b>		<b>\$ (100,000)</b>



# ADDING/DROPPING SEGMENTS

## Segment Income Statement Digital Watches

<b>Sales</b>		<b>\$ 500,000</b>
<b>Less: variable expenses</b>		
<b>Variable manufacturing costs</b>	<b>\$ 120,000</b>	
<b>Variable shipping costs</b>	<b>5,000</b>	
<b>Commissions</b>	<b>75,000</b>	<b>200,000</b>
<b>Contribution margin</b>		<b>\$ 300,000</b>
<b>Less: fixed expenses</b>		
<b>General factory overhead</b>	<b>\$ 60,000</b>	
<b>Salary of line manager</b>	<b>90,000</b>	
<b>Depreciation of equipment</b>	<b>50,000</b>	
<b>Advertising - direct</b>	<b>100,000</b>	
<b>Rent - factory space</b>	<b>70,000</b>	
<b>General admin. expenses</b>	<b>30,000</b>	<b>400,000</b>
<b>Net operating loss</b>		<b>\$ (100,000)</b>

Investigation has revealed that total fixed general factory overhead and general administrative expenses would not be affected if the digital watch line is dropped. The fixed general factory overhead and general administrative expenses assigned to this product would be reallocated to other product lines.



# ADDING/DROPPING SEGMENTS

## Segment Income Statement Digital Watches

Sales	\$ 500,000
Less: variable expenses	
Variable manufacturing costs	\$ 120,000
Variable selling expenses	80,000
Contract labor	100,000
General factory overhead	60,000
Salary of line manager	90,000
Depreciation of equipment	50,000
Advertising - direct	30,000
Rent - factory space	40,000
General admin. expenses	50,000
Net operating loss	\$ (100,000)

The equipment used to manufacture digital watches has no resale value or alternative use.

**Should Lovell retain or drop the digital watch segment?**



# A CONTRIBUTION MARGIN APPROACH

## Contribution Margin Approach

- Shortcut method
- Called contribution margin because the excess of sales revenue over variable costs contributes to covering fixed costs

$$\begin{aligned} &\text{Sales revenue} \\ &- \text{Variable costs} \\ &= \text{Contribution margin} \\ &- \text{Fixed costs} \\ &= \text{Operating income} \end{aligned}$$

## DECISION RULE

- Lovell should drop the digital watch segment only if its profit would increase. This would only happen if the fixed cost savings **exceed** the lost contribution margin.

# A CONTRIBUTION MARGIN APPROACH

## Contribution Margin Solution

<b>Contribution margin lost if digital watches are dropped</b>	<b>\$ (300,000)</b>
<b>Less fixed costs that can be avoided</b>	
<b>Salary of the line manager</b>	<b>\$ 90,000</b>
<b>Advertising - direct</b>	<b>100,000</b>
<b>Rent - factory space</b>	<b>70,000</b>
	<b><u>260,000</u></b>
<b>Net disadvantage</b>	<b><u>\$ (40,000)</u></b>



# COMPARATIVE INCOME APPROACH

The Lovell solution can also be obtained by preparing comparative income statements showing results with and without the digital watch segment.

**Let's look at this second approach.**



## Comparative Income Approach Solution

	Keep Digital Watches	Drop Digital Watches	Difference
<b>Sales</b>	<b>\$ 500,000</b>	<b>\$ -</b>	<b>\$ (500,000)</b>
<b>Less variable expenses:</b>			
Manufacturing expenses	120,000	-	120,000
Shipping	5,000	-	5,000
Commissions	75,000	-	75,000
<b>Total variable expenses</b>	<b>200,000</b>	<b>-</b>	<b>200,000</b>
<b>Contribution margin</b>	<b>300,000</b>	<b>-</b>	<b>(300,000)</b>
<b>Less fixed expenses:</b>			
General factory overhead	60,000		
Salary of line manager	90,000		
Depreciation	50,000		
Advertising - direct	100,000		
Rent - factory space	70,000		
General admin. expenses	30,000		
<b>Total fixed expenses</b>	<b>400,000</b>		
<b>Net operating loss</b>	<b>\$ (100,000)</b>		

If the digital watch line is dropped, the company gives up its contribution margin.

## Comparative Income Approach Solution

	Keep Digital Watches	Drop Digital Watches	Difference
<b>Sales</b>	<b>\$ 500,000</b>	<b>\$ -</b>	<b>\$ (500,000)</b>
<b>Less variable expenses:</b>			
Manufacturing expenses	120,000	-	120,000
Shipping	5,000	-	5,000
Commissions	75,000	-	75,000
<b>Total variable expenses</b>	<b>200,000</b>	<b>-</b>	<b>200,000</b>
<b>Contribution margin</b>	<b>300,000</b>	<b>-</b>	<b>(300,000)</b>
<b>Less fixed expenses:</b>			
General factory overhead	60,000	60,000	-
Salary of line manager	90,000		
Depreciation	50,000		
Advertising - direct			
Rent - factory space			
General admin. expenses			
<b>Total fixed expenses</b>	<b>100,000</b>		
<b>Net operating loss</b>	<b>\$ (100,000)</b>		

On the other hand, the general factory overhead would be the same. So this cost really isn't relevant

## Comparative Income Approach Solution

	Keep Digital Watches	Drop Digital Watches	Difference
<b>Sales</b>			
Less variable expenses:			
Manufacturing expenses			
Shipping	3,000	-	3,000
Commissions	75,000	-	75,000
Total variable expenses	<u>200,000</u>	<u>-</u>	<u>200,000</u>
Contribution margin	300,000	-	<u>(300,000)</u>
Less fixed expenses:			
General factory overhead	60,000	60,000	-
Salary of line manager	90,000	-	90,000
Depreciation	50,000		
Advertising - direct	100,000		
Rent - factory space	70,000		
General admin. expenses	30,000		
Total fixed expenses	<u>400,000</u>		
Net operating loss	<u><u>\$ (100,000)</u></u>		

But we wouldn't need a manager for the  
 product line anymore.



## Comparative Income Approach Solution

	Keep Digital Watches	Drop Digital Watches	Difference
Sales	<u>\$ 500,000</u>	<u>\$ -</u>	<u>\$ (500,000)</u>
Less variable expenses:			
Manufacturing expenses	120,000	-	120,000

If the digital watch line is dropped, the net book value of the equipment would be written off. The depreciation that would have been taken will flow through the income statement as a loss instead.

Contribution margin	300,000	-	(300,000)
Less fixed expenses:			
General factory overhead	60,000	60,000	-
Salary of line manager	90,000	-	90,000
Depreciation	50,000	50,000	-
Advertising - direct	100,000		
Rent - factory space	70,000		
General admin. expenses	30,000		
Total fixed expenses	400,000		
Net operating loss	<u><u>\$ (100,000)</u></u>		

**Comparative Income Approach**  
**Solution**

	Keep Digital Watches	Drop Digital Watches	Difference
<b>Sales</b>	<b>\$ 500,000</b>	<b>\$ -</b>	<b>\$ (500,000)</b>
<b>Less variable expenses:</b>			
<b>Manufacturing expenses</b>	<b>120,000</b>	-	<b>120,000</b>
<b>Shipping</b>	<b>5,000</b>	-	<b>5,000</b>
<b>Commissions</b>	<b>75,000</b>	-	<b>75,000</b>
<b>Total variable expenses</b>	<b>200,000</b>	-	<b>200,000</b>
<b>Contribution margin</b>	<b>300,000</b>	-	<b>(300,000)</b>
<b>Less fixed expenses:</b>			
<b>General factory overhead</b>	<b>60,000</b>	<b>60,000</b>	-
<b>Salary of line manager</b>	<b>90,000</b>	-	<b>90,000</b>
<b>Depreciation</b>	<b>50,000</b>	<b>50,000</b>	-
<b>Advertising - direct</b>	<b>100,000</b>	-	<b>100,000</b>
<b>Rent - factory space</b>	<b>70,000</b>	-	<b>70,000</b>
<b>General admin. expenses</b>	<b>30,000</b>	<b>30,000</b>	-
<b>Total fixed expenses</b>	<b>400,000</b>	<b>140,000</b>	<b>260,000</b>
<b>Net operating loss</b>	<b>\$ (100,000)</b>	<b>\$ (140,000)</b>	<b>\$ (40,000)</b>

# BEWARE OF ALLOCATED FIXED COSTS



# BEWARE OF ALLOCATED FIXED COSTS



The answer lies in the  
way we allocate  
**common fixed costs** to  
our products.

# BEWARE OF ALLOCATED FIXED COSTS



Our allocations  
can make a  
segment look  
**less profitable**  
than it really is.

## Section 3

CONSIDER THE VARIOUS BUSINESS DECISIONS IN ACCEPTANCE OF SPECIAL ORDER, ADD OR DROP A PRODUCT LINE OR SEGMENT, MAKE OR BUY DECISION; AND FURTHER PROCESSING DECISION.

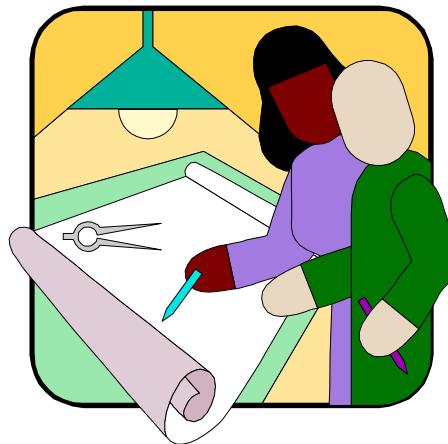
## Section 3

CONSIDER THE VARIOUS BUSINESS DECISIONS IN ACCEPTANCE OF SPECIAL ORDER, ADD OR DROP A PRODUCT LINE OR SEGMENT, MAKE OR BUY DECISION; AND FURTHER PROCESSING DECISION.

# THE MAKE OR BUY DECISION

A decision concerning whether an item should be produced internally or purchased from an outside supplier is called a “make or buy” decision.

Let's look at the Essex Company example.



# THE MAKE OR BUY DECISION

- Essex manufactures part 4A that is used in one of its products.
- The unit product cost of this part is:

<b>Direct materials</b>	\$ 9
<b>Direct labor</b>	5
<b>Variable overhead</b>	1
<b>Depreciation of special equip.</b>	3
<b>Supervisor's salary</b>	2
<b>General factory overhead</b>	10
<b>Unit product cost</b>	<u><u>\$ 30</u></u>

# THE MAKE OR BUY DECISION

- The special equipment used to manufacture part 4A has no resale value.
- The total amount of general factory overhead, which is allocated on the basis of direct labor hours, would be unaffected by this decision.
- The \$30 unit product cost is based on 20,000 parts produced each year.
- An outside supplier has offered to provide the 20,000 parts at a cost of \$25 per part.

**Should we accept the supplier's offer?**

# THE MAKE OR BUY DECISION

	Cost Per Unit	Cost of 20,000 Units	
		Make	Buy
Outside purchase price	\$ 25		\$ 500,000
Direct materials	\$ 9	180,000	
Direct labor	5	100,000	
Variable overhead	1	20,000	
Depreciation of equip.	3	-	
Supervisor's salary	2	40,000	
General factory overhead	10	-	
Total cost	\$ 30	\$ 340,000	\$ 500,000

$$20,000 \times \$9 \text{ per unit} = \$180,000$$

# THE MAKE OR BUY DECISION

	Cost Per Unit	Cost of 20,000 Units	
		Make	Buy
Outside purchase price	\$ 25		\$ 500,000
Direct materials	\$ 9	180,000	
Direct labor	5	100,000	
Variable overhead	1	20,000	
Depreciation of equip.	3	-	
Supervisor's salary	2	40,000	
General factory overhead	10	-	
Total cost	\$ 30	\$ 340,000	\$ 500,000

The special equipment has no resale value and is a sunk cost.

# THE MAKE OR BUY DECISION

	Cost Per Unit	Cost of 20,000 Units	
		Make	Buy
Outside purchase price	<u>\$ 25</u>		<u>\$ 500,000</u>
Direct materials	\$ 9	180,000	
Direct labor	5	100,000	
Variable overhead	1	20,000	
Depreciation of equip.	3	-	
Supervisor's salary	2	40,000	
General factory overhead	10	-	
Total cost	<u>\$ 30</u>	<u>\$ 340,000</u>	<u>\$ 500,000</u>

Not avoidable; irrelevant. If the product is dropped, it will be reallocated to other products.

# THE MAKE OR BUY DECISION

	Cost Per Unit	Cost of 20,000 Units	
		Make	Buy
Outside purchase price	\$ 25		\$ 500,000
Direct materials	\$ 9	180,000	
Direct labor	5	100,000	
Variable overhead	1	20,000	
Depreciation of equip.	3	-	
Supervisor's salary	2	40,000	
General factory overhead	10	-	
Total cost	\$ 30	\$ 340,000	\$ 500,000

**Should we make or buy part 4A?**

# THE MAKE OR BUY DECISION

## DECISION RULE

In deciding whether to accept the outside supplier's offer, Essex isolated the relevant costs of making the part by **eliminating**:

- The sunk costs.
- The future costs that will not differ between making or buying the parts.

# OPPORTUNITY COST

The benefits that are **foregone** as a result of pursuing some course of action.

Opportunity costs are not actual dollar outlays and are not recorded in the formal accounts of an organization.



# SPECIAL ORDERS

- Jet, Inc. makes a single product whose normal selling price is \$20 per unit.
- A foreign distributor offers to purchase 3,000 units for \$10 per unit.
- This is a one-time order that would not affect the company's regular business.
- Annual capacity is 10,000 units, but Jet, Inc. is currently producing and selling only 5,000 units.

**Should Jet accept the offer?**

# SPECIAL ORDERS

**Jet, Inc.**  
**Contribution Income Statement**

<b>Revenue</b>	$(5,000 \times \$20)$	<b>\$ 100,000</b>
<b>Variable costs:</b>		
Direct materials	<b>\$ 20,000</b>	
Direct labor	<b>5,000</b>	
Manufacturing overhead	<b>10,000</b>	<b>\$8 variable cost</b>
Marketing costs	<b>5,000</b>	
	<hr/>	<hr/>
<b>Total variable costs</b>		<b>40,000</b>
<b>Contribution margin</b>		<hr/>
		<b>60,000</b>
<b>Fixed costs:</b>		
Manufacturing overhead	<b>\$ 28,000</b>	
Marketing costs	<b>20,000</b>	
	<hr/>	<hr/>
<b>Total fixed costs</b>		<b>48,000</b>
<b>Net operating income</b>		<hr/>
		<b>\$ 12,000</b>

# SPECIAL ORDERS

If Jet accepts the offer, net operating income will increase by \$6,000.

Increase in revenue ( $3,000 \times \$10$ )	\$30,000
Increase in costs ( $3,000 \times \$8$ variable cost)	<u>24,000</u>
Increase in net income	<u><u>\$ 6,000</u></u>

Note: This answer assumes that fixed costs are unaffected by the order and that variable marketing costs must be incurred on the special order.

# UTILIZATION OF A CONSTRAINED RESOURCE

- Companies usually have **limited resources**, such as limits on space, on the number of workers, or even on the machine capacity needed to produce goods. This reality means that in order to best use limited production capabilities, managers must choose which products to make and sell.
- Managerial accountants use a simple technique of **dividing contribution margin by a measure of the constrained resource** to indicate which products squeeze the most profitability out of constrained resources.
- Firms often face the problem of deciding how to best utilize a constrained resource.
- Usually fixed costs are not affected by this particular decision, so management can focus on maximizing total contribution margin.

Let's look at the Ensign Company example.

# UTILIZATION OF A CONSTRAINED RESOURCE

Ensign Company produces two products and selected data is shown below:

	Product	
	1	2
Selling price per unit	\$ 60	\$ 50
Less variable expenses per unit	36	35
Contribution margin per unit	\$ 24	\$ 15
Current demand per week (units)	2,000	2,200
Contribution margin ratio	40%	30%
Processing time required on machine A1 per unit	1.00 min.	0.50 min.

# UTILIZATION OF A CONSTRAINED RESOURCE

- Machine A1 is the constrained resource and is being used at 100% of its capacity.
- There is excess capacity on all other machines.
- Machine A1 has a capacity of 2,400 minutes per week.

Should Ensign focus its efforts on Product 1 or 2?

# UTILIZATION OF A CONSTRAINED RESOURCE

The key is the contribution margin per unit of the constrained resource.

	Product	
	1	2
Contribution margin per unit	\$ 24	\$ 15
Time required to produce one unit	÷ 1.00 min.	÷ 0.50 min.
Contribution margin per minute	\$ 24 min.	\$ 30 min.

Product 2 should be emphasized. Provides more valuable use of the constrained resource machine A1, yielding a contribution margin of \$30 per minute as opposed to \$24 for Product 1.

# UTILIZATION OF A CONSTRAINED RESOURCE

The key is the contribution margin per unit of the constrained resource.

	Product	
	1	2
Contribution margin per unit	\$ 24	\$ 15
Time required to produce one unit	÷ 1.00 min.	÷ 0.50 min.
Contribution margin per minute	\$ 24 min.	\$ 30 min.

If there are no other considerations, the best plan would be to produce to meet current demand for Product 2 and then use remaining capacity to make Product 1.

# UTILIZATION OF A CONSTRAINED RESOURCE

**Let's see how this plan would work.**

## Alloting Our Constrained Recource (Machine A1)

<b>Weekly demand for Product 2</b>	<b>2,200</b>	<b>units</b>	
<b>Time required per unit</b>	<b>x</b>	<b>0.50</b>	<b>min.</b>
<b>Total time required to make</b>			
<b>Product 2</b>		<b>1,100</b>	<b>min.</b>

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# UTILIZATION OF A CONSTRAINED RESOURCE

Let's see how this plan would work.

## Alloting Our Constrained Recource (Machine A1)

Weekly demand for Product 2                            2,200 units

Time required per unit                            ×        0.50 min.

Total time required to make  
Product 2

1,100 min.

Total time available

2,400 min.

Time used to make Product 2

1,100 min.

Time available for Product 1

1,300 min.

# UTILIZATION OF A CONSTRAINED RESOURCE

Let's see how this plan would work.

## Alloting Our Constrained Resource (Machine A1)

Weekly demand for Product 2	2,200	units
Time required per unit	$\times$	0.50 min.
Total time required to make Product 2		<u>1,100</u> min.
Total time available	2,400	min.
Time used to make Product 2	<u>1,100</u>	min.
Time available for Product 1	1,300	min.
Time required per unit	$\div$	1.00 min.
Production of Product 1	<u>1,300</u>	units

# UTILIZATION OF A CONSTRAINED RESOURCE

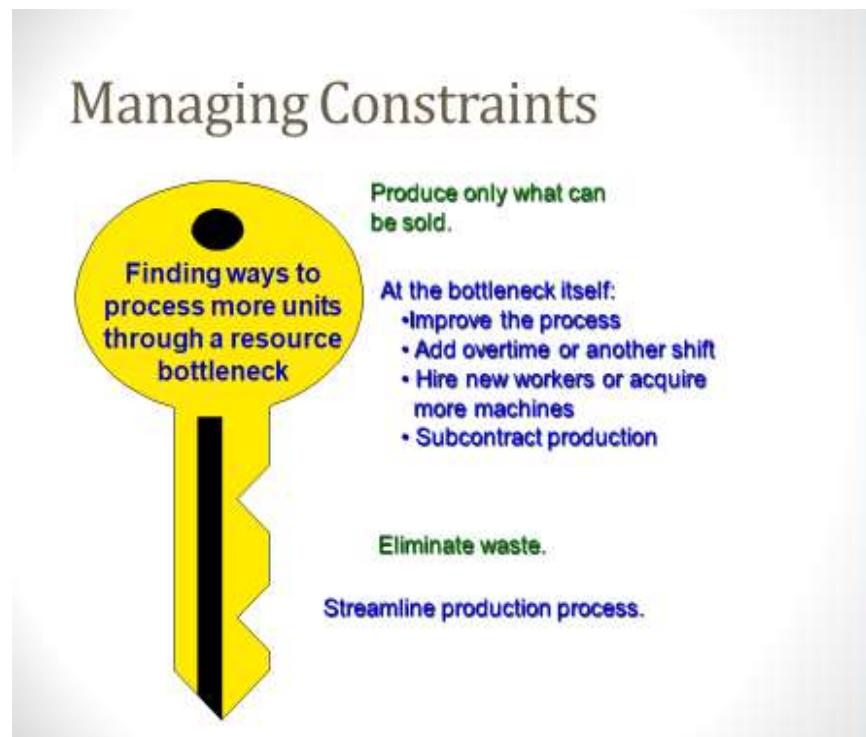
According to the plan, we will produce 2,200 units of Product 2 and 1,300 of Product 1. Our contribution margin looks like this.

	<u>Product 1</u>	<u>Product 2</u>
<b>Production and sales (units)</b>	1,300	2,200
<b>Contribution margin per unit</b>	\$ 24	\$ 15
<b>Total contribution margin</b>	<u><u>\$ 31,200</u></u>	<u><u>\$ 33,000</u></u>

The total contribution margin for Ensign is \$64,200.

# MANAGING CONSTRAINTS

- Constraints are anything that **limits a system** from achieving higher performance. On the highway, accidents that prevent you from driving 65 miles per hour to work in the morning are constraints. Constraints can occur in any process, whether in manufacturing or service industries.

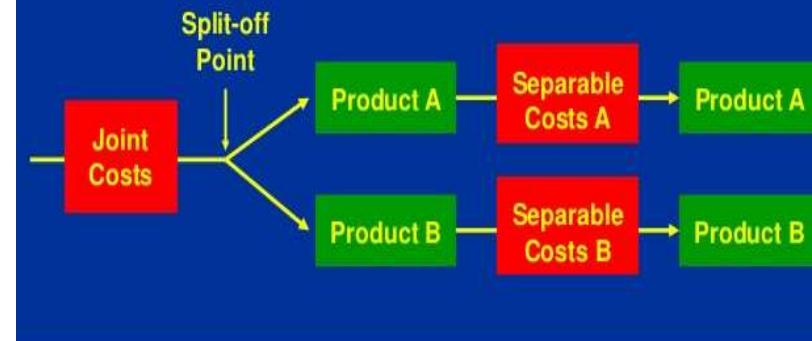


# JOINT COSTS

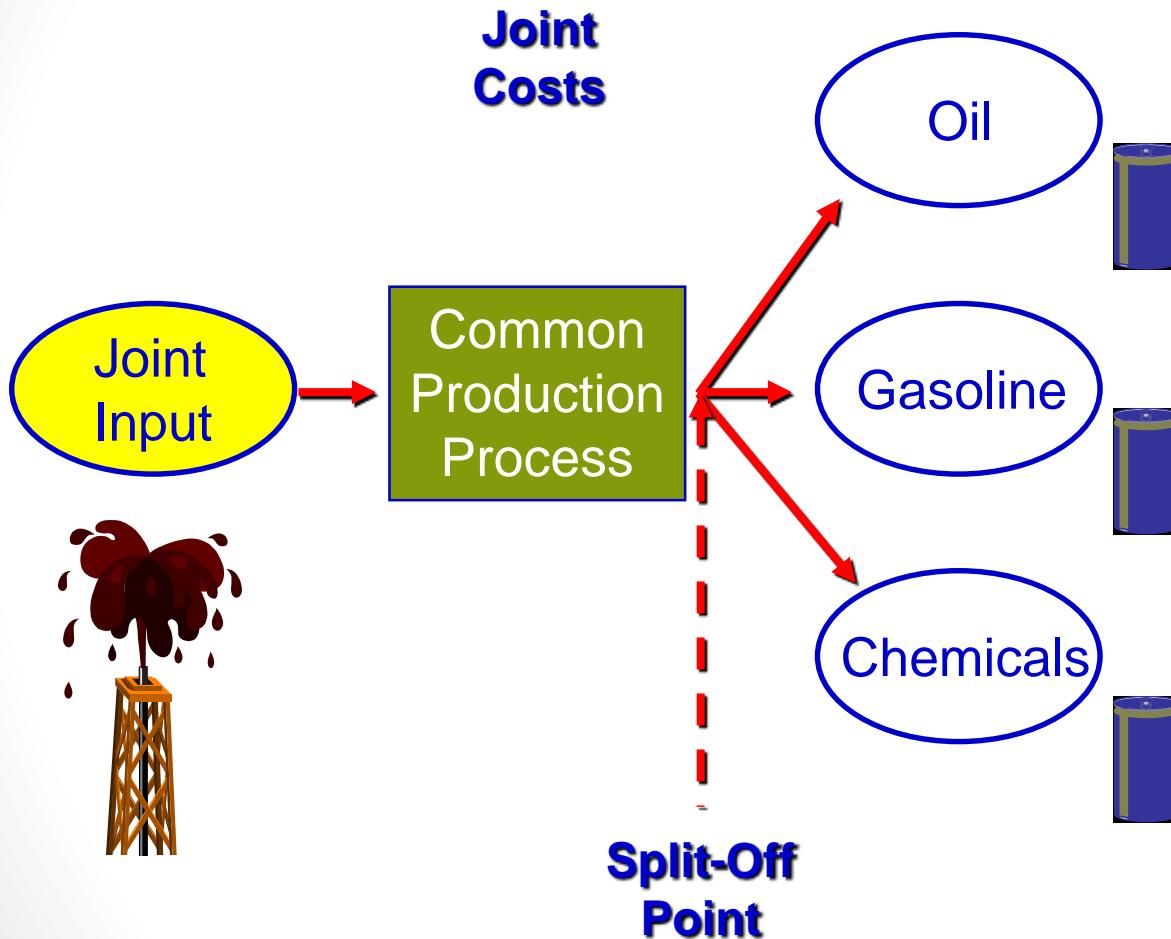
- In accounting, a joint cost is a cost incurred in a joint process. **Joint costs may include direct material, direct labor, and overhead costs** incurred during a joint production process.
- A joint process is a production process in which one input yields multiple outputs. It is a process in which seeking to create one type of output product automatically also creates other types of output product.
- In some industries, a number of end products are produced from a single raw material input.
- Two or more products produced from a common input are called joint products.
- The point in the manufacturing process where each joint product can be recognized as a separate product is called the **split-off point**.

## Joint Products in Joint Processes

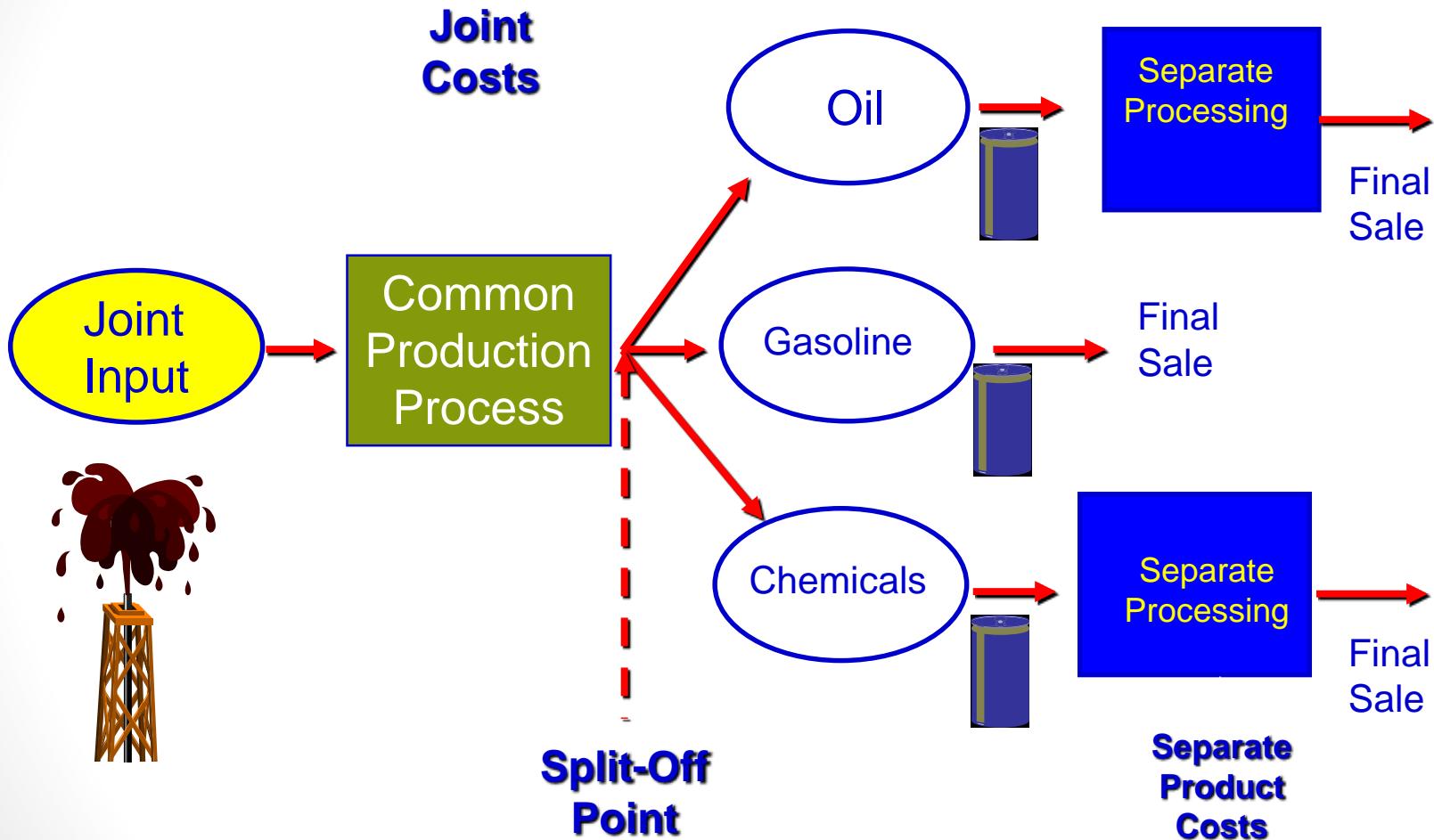
- Joint costs are costs which are incurred up to split-off point
- Split-off point is the juncture in the process when separate identifiable products emerge
- Separable costs are costs incurred beyond the split-off point and are assignable to separate products



# JOINT COSTS



# JOINT COSTS



# THE PITFALLS OF ALLOCATION



Joint costs are really common costs incurred to simultaneously produce a variety of end products.

Joint costs are often allocated to end products on the basis of the relative sales value of each product or on some other basis.

# SELL OR PROCESS FURTHER

It will always profitable to continue processing a joint product **after the split-off point** so long as the incremental revenue exceeds the incremental processing costs incurred after the split-off point.

[Let's look at the Sawmill, Inc. example.](#)



# SELL OR PROCESS FURTHER

- Sawmill, Inc. cuts logs from which unfinished lumber and **sawdust are the immediate joint products.**
- Unfinished lumber is sold “as is” or processed further into finished lumber.
- Sawdust can also be sold “as is” to gardening wholesalers or processed further into “presto-logs.”



# SELL OR PROCESS FURTHER

Data about Sawmill's joint products includes:

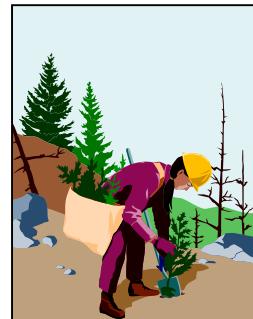
	Per Log	
	Lumber	Sawdust
<b>Sales value at the split-off point</b>	\$ 140	\$ 40
<b>Sales value after further processing</b>	270	50
<b>Allocated joint product costs</b>	176	24
<b>Cost of further processing</b>	50	20



# SELL OR PROCESS FURTHER

## Analysis of Sell or Process Further

	Per Log	
	Lumber	Sawdust
Sales value after further processing	\$ 270	\$ 50
Sales value at the split-off point	140	40
Incremental revenue	130	10



# SELL OR PROCESS FURTHER

## Analysis of Sell or Process Further

	Per Log	
	Lumber	Sawdust
<b>Sales value after further processing</b>	\$ 270	\$ 50
<b>Sales value at the split-off point</b>	140	40
<b>Incremental revenue</b>	130	10
<b>Cost of further processing</b>	50	20
<b>Profit (loss) from further processing</b>	<u>\$ 80</u>	<u>\$ (10)</u>



# SELL OR PROCESS FURTHER

## Analysis of Sell or Process Further

	Per Log	
	Lumber	Sawdust
Sales value after further processing	\$ 270	\$ 50
Sales value at the split-off point	140	40
Incremental revenue	130	10
Cost of further processing	50	20
Profit (loss) from further processing	\$ 80	\$ (10)

Should we process the lumber further  
and sell the sawdust “as is?”

