Advanced Cost Accounting

Accounting Department

spring 2024

Part Four

Differential Analysis: The Key to Decision Making

1. Relevant Costs and Benefits
2. Decision Making:

- Adding or Dropping Segments
- Make or Buy
- Accept or Reject special order
- Allocation of limited resources
- Sell or Process Further

Relevant Costs and Benefits

A **relevant cost** is a cost that differs between alternatives.

A relevant benefit is a benefit that differs between alternatives.

Identifying Relevant Costs

An avoidable cost is a cost that can be eliminated, in whole or in part, by choosing one alternative over another. Avoidable costs are relevant costs. Unavoidable costs are irrelevant costs.

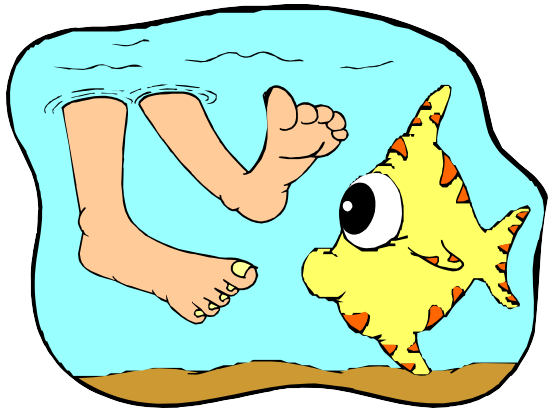
Two broad categories of costs are never relevant in any decision. They include:

1. **Sunk costs.**
2. **A future cost that does not differ between the alternatives.**

Decision Making: A Two-Step Process

Step 1 Eliminate costs and benefits that do not differ between alternatives.

Step 2 Use the remaining costs and benefits that differ between alternatives in making the decision. The costs that remain are the differential, or avoidable, costs.



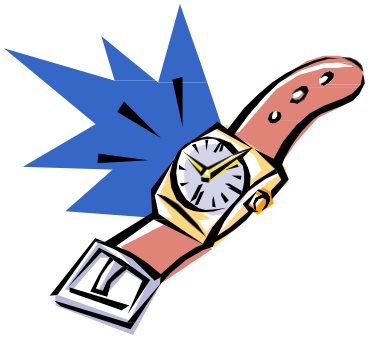
Adding/Dropping Segments

One of the most important decisions managers make is whether to add or drop a business segment. Ultimately, a decision to drop an old segment or add a new one is going to hinge primarily on the impact the decision will have on net operating income.

To assess this impact, it is necessary to carefully analyze the costs.

Adding/Dropping Segments

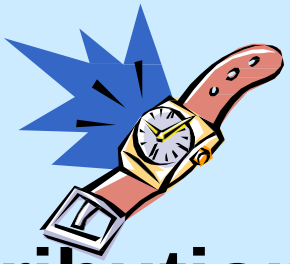
Due to the declining popularity of digital watches, Lovell Company's digital watch line has not reported a profit for several years. Lovell is considering discontinuing this product line.



A Contribution Margin Approach

DECISION RULE

Lovell should drop the digital watch segment only if its profit would increase.



Lovell will compare the contribution margin that would be lost to the costs that would be avoided if the line was to be dropped.

Practical Example 1

Saro Co. has four production line. The following analysed income statement is available (numbers are in USdollar):

Details	A	B	C	D	Total
Sales Revenue	900	700	400	300	2300
Variable Costs	(500)	(400)	(250)	(250)	(1400)
Contribution Margin	400	300	150	50	900
Fixed Costs (General)	(90)	(70)	(40)	(30)	(230)
Fixed Costs (Related to the dep.)	(180)	(310)	(60)	(40)	(590)
Net Operating Income	130	(80)	50	(20)	80

Required: As a managerial accountant what is your suggestion regarding the following choices separately:

1. Drop production line D.
2. Drop production line B.

Solution

1. Drop production line D.

Details	A	B	C	D	Total
Sales Revenue	900	700	400	0	2000
Variable Costs	(500)	(400)	(250)	0	(1150)
Contribution Margin	400	300	150	0	850
Fixed Costs (General)	(90)	(70)	(40)	(30)	(230)
Fixed Costs (Related to the dep.)	(180)	(310)	(60)	(0)	(550)
Net Operating Income	130	(80)	50	(30)	70

From the above table, It can be seen that, if the Merchant Company eliminates Product line D, the total net income will be decreased by $10 (From $80 to $70), therefore, Product line D should not be eliminated.

2. Drop production line B

Details	A	B	C	D	Total
Sales Revenue	900	0	400	300	1600
Variable Costs	(500)	0	(250)	(250)	(1000)
Contribution Margin	400	0	150	50	600
Fixed Costs (General)	(90)	(70)	(40)	(30)	(230)
Fixed Costs (Related to the dep.)	(180)	(0)	(60)	(40)	(280)
Net Operating Income	130	(70)	50	(20)	90

From the above table, It can be seen that, if the Merchant Company beliminates Product line B, the total net income will be increased by $10 (From $80 to $90), therefore, Product line B should be eliminated.

Practical Example 1

Merchant Company manufactures and sells three models of electronic printers. Ken Gail, president of the company, is considering dropping model JT484 from its product line because the company has experienced losses for this product during the past three quarters. The following product-level operating data have been compiled for the most recent quarter:

CATEGORY	Total	JT284	JT384	JT484
Sales	$1,000,000	$500,000	$200,000	$300,000
Variable costs	$600,000	$300,000	$100,000	$200,000
Contribution margin	$400,000	$200,000	$100,000	$100,000
Fixed costs:				
Rent	$50,000	$25,000	$10,000	$15,000
Depreciation	$60,000	$30,000	$12,000	$18,000
Utilities	$40,000	$20,000	$5,000	$15,000
Supervision	$50,000	$15,000	$5,000	$30,000
Maintenance	$30,000	$15,000	$6,000	$9,000
Administrative	$100,000	$30,000	$20,000	$50,000
Total fixed costs	$330,000	$135,000	$58,000	$137,000
Operating income (loss)	$70,000	$65,000	$42,000	-$37,000

In addition, the following information is also available:

- Factory rent and depreciation will not be affected by a decision to drop model JT484.
- Quarterly utility bills will be reduced from $40,000 to $31,000 if JT484 is dropped.
- Supervision costs for JT484 can be eliminated if dropped.
- The maintenance department will be able to reduce quarterly costs by $7,000 if JT484 is dropped.
- Elimination of JT484 will make it possible to eliminate two administrative
- staff positions with combined salaries of $30,000 per quarter.

Required:

a) Should Merchant Company eliminate JT484?.

a) Merchant's sales manager believes that it is important to continue to produce JT484 to maintain a full product line. He expects the elimination of JT484 will reduce sales of the remaining two products by 5% each. Will this information change your answer to part a? Explain.

Solution:

a) In case the Merchant Company eliminates printer JT484 the following will be happening:

CATEGORY	Total	JT284	JT384	JT484
Sales	$1,000,000	$500,000	$200,000	$0
Variable costs	$600,000	$300,000	$100,000	$0
Contribution margin	$300,000	$200,000	$100,000	$0
Fixed costs:				
Rent	$50,000	$25,000	$10,000	$15,000
Depreciation	$60,000	$30,000	$12,000	$18,000
Utilities	$31,000	$20,000	$5,000	$6,000
Supervision	$20,000	$15,000	$5,000	$0
Maintenance	$23,000	$15,000	$6,000	$2,000
Administrative	$70,000	$30,000	$20,000	$20,000
Total fixed costs	$254,000	$135,000	$58,000	$61,000
Operating income (loss)	$46,000	$65,000	$42,000	-$61,000

From the above table, It can be seen that, if the Merchant Company eliminates printer JT484, the total net income will be decreased by $24,000 (From $70,000 to $46,000), therefore, the printer JT484 **should not be eliminated**. This also can be further explained through the following:

Eliminating printer JT484 will save the Cost by:

Utilities cost+ Supervision cost+ Maintenance cost +Administrative cost

=$9,000+S30,000+$7,000+ $30,000
= $76,000

In addition, it is given that the contribution margin for printer JT484 is $100,000 which absorbs the fixed costs.

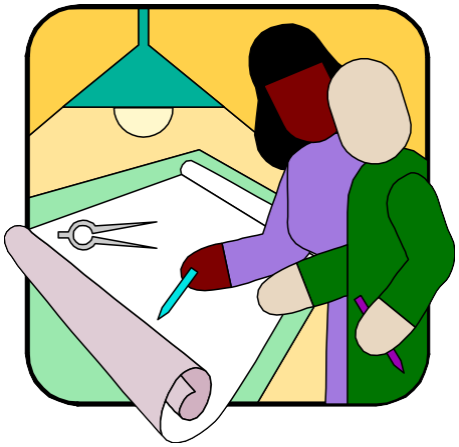
Decrease in operating income= contribution margin- cost saving
= $100,000- $76,000 = $24,000
As a result, and due to the $24,000 decrease in the operating income, it is advised to keep producing the printer JT484.

Keep producing printer JT484 is a correct decision due to the following reasons:

The sales manager beliefs of maintaining the full product line could to meet to different customer's requirements.
Since eliminting printer JT484 could led to 5% reduction in sales. So revenue will reduce, leading us to recommend retaining the printer JT484.

The Make or Buy Decision

When a company is involved in more than one activity in the entire value chain, it is vertically integrated. A decision to carry out one of the activities in the value chain internally, rather than to buy externally from a supplier is called a "make or buy" decision.



Vertical Integration- Advantages

Smoother flow of parts and materials

Better quality control

Realize profits

Vertical Integration- Disadvantage

Companies may fail to take advantage of suppliers who can create economies of scale advantage by pooling demand from numerous companies.

While the economics of scale factor can be appealing, a company must be careful to retain control over activities that are essential to maintaining its competitive position.

Practical Example

Fenk Co. produces and sales 20,000 air conditioners annually. The company has alternatives either to produce internally or buy externally regarding air conditioner motor.

Costs of producing one motor internally: raw materials $28, direct labour $31, variable MOH $14, and Fixed MOH $16 (%30 related to produce motors only and %70 related to general procedure).

Cost to buy one motor externally is $74.

Required: as a managerial accountant give your recommendation:

1. Produce or buy the products at 20,000 units of production.
2. Produce or buy the products if production rises to 80,000 units.
3. What is the symmetry point (i.e. the point where there is no difference between the two alternatives)?

Example 2

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

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

The Make or Buy

1. **The special equipment used to manufacture part 4A has no resale value.**
2. **The total amount of general factory overhead, which is allocated on the basis of direct labor hours, would be unaffected by this decision.**
3. **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 × $9 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	$ 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

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

The Make or Buy

	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?

Accept or Reject special orders

A special order is a one-time order that is not considered part of the company's normal ongoing business.

When analyzing a special order, only the incremental costs and benefits are relevant.

Since the existing fixed manufacturing overhead costs would not be affected by the order, they are not relevant.

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

Revenue (5,000 × $20)		$ 100,000
Variable costs:		
Direct materials	$ 20,000	
Direct labor	5,000	
Manufacturing overhead	10,000	
Marketing costs	5,000	
Total variable costs		40,000
Contribution margin		60,000
Fixed costs:		
Manufacturing overhead	$ 28,000	
Marketing costs	20,000	
Total fixed costs		48,000
Net operating income		$ 12,000

$8 variable cost

Special Orders

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

Increase in revenue (3,000 × $10)	$30,000
Increase in costs (3,000 × $8 variable cost)	24,000
Increase in net income	$ 6,000

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

Practical Example

Kashan manufacturing company for furniture has a productive capacity of 1,000 beds annually. The company produced and sales 750 beds at selling price $1,750 per bed.

The company receives a special order from Roma hotel to produce 250 beds for $1,500 per unit.

Related costs of the beds are: raw materials $800, direct labour $200, other variable costs $250, total fixed costs $160,000, and sales commission $50,000.

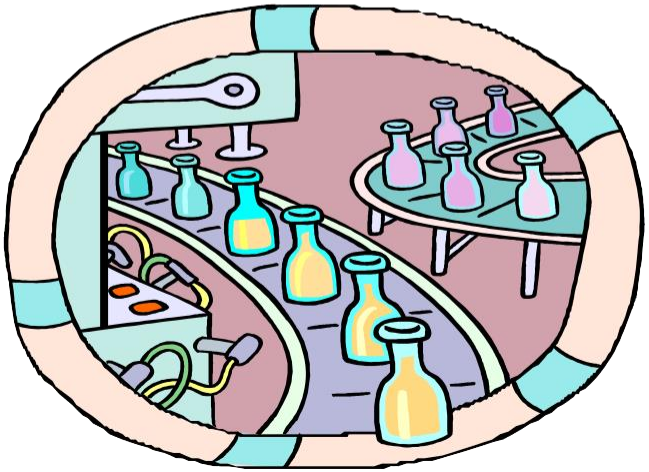
A special design is also required by the hotel which costs the company $25,000.

Required: what is your suggestion concerning that special order.

Allocation of limited resources

When a limited resource of some type restricts the company's ability to satisfy demand, the company is said to have a constraint.

The machine or process that is limiting overall output is called the bottleneck – it is the constraint.



Utilization of a Constrained Resource

- **Fixed costs are usually unaffected in these situations, so the product mix that maximizes the company's total contribution margin should ordinarily be selected.**
- **A company should not necessarily promote those products that have the highest unit contribution margins.**
- **Rather, total contribution margin will be maximized by promoting those products or accepting those orders that provide the highest contribution margin in relation to the constraining resource.**

Managing Constraints

It is often possible for a manager to increase the capacity of a bottleneck, which is called relaxing (or elevating) the constraint, in numerous ways such as:

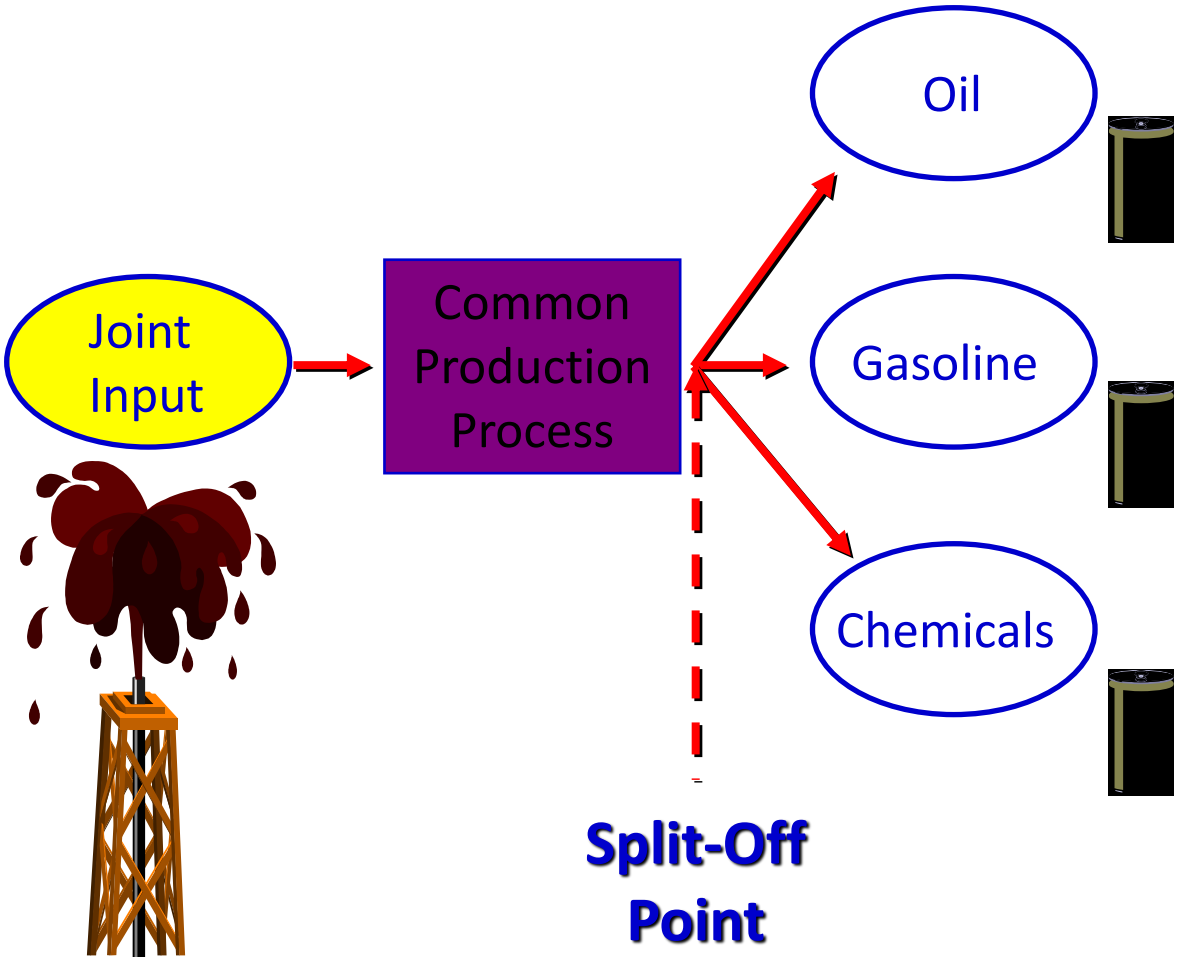
1. **Working overtime on the bottleneck.**
2. **Subcontracting some of the processing that would be done at the bottleneck:** **the practice of bringing in an outside company or individual to perform specific parts of a contract or project**. In most cases, a company subcontracts another business to perform a task that cannot be handled internally.
3. **Investing in additional machines at the bottleneck.**
4. **Shifting workers from non-bottleneck processes to the bottleneck.**
5. **Focusing business process improvement efforts on the bottleneck.**
6. **Reducing defective units processed through the bottleneck.**

These methods and ideas are all consistent with the Theory of Constraints.

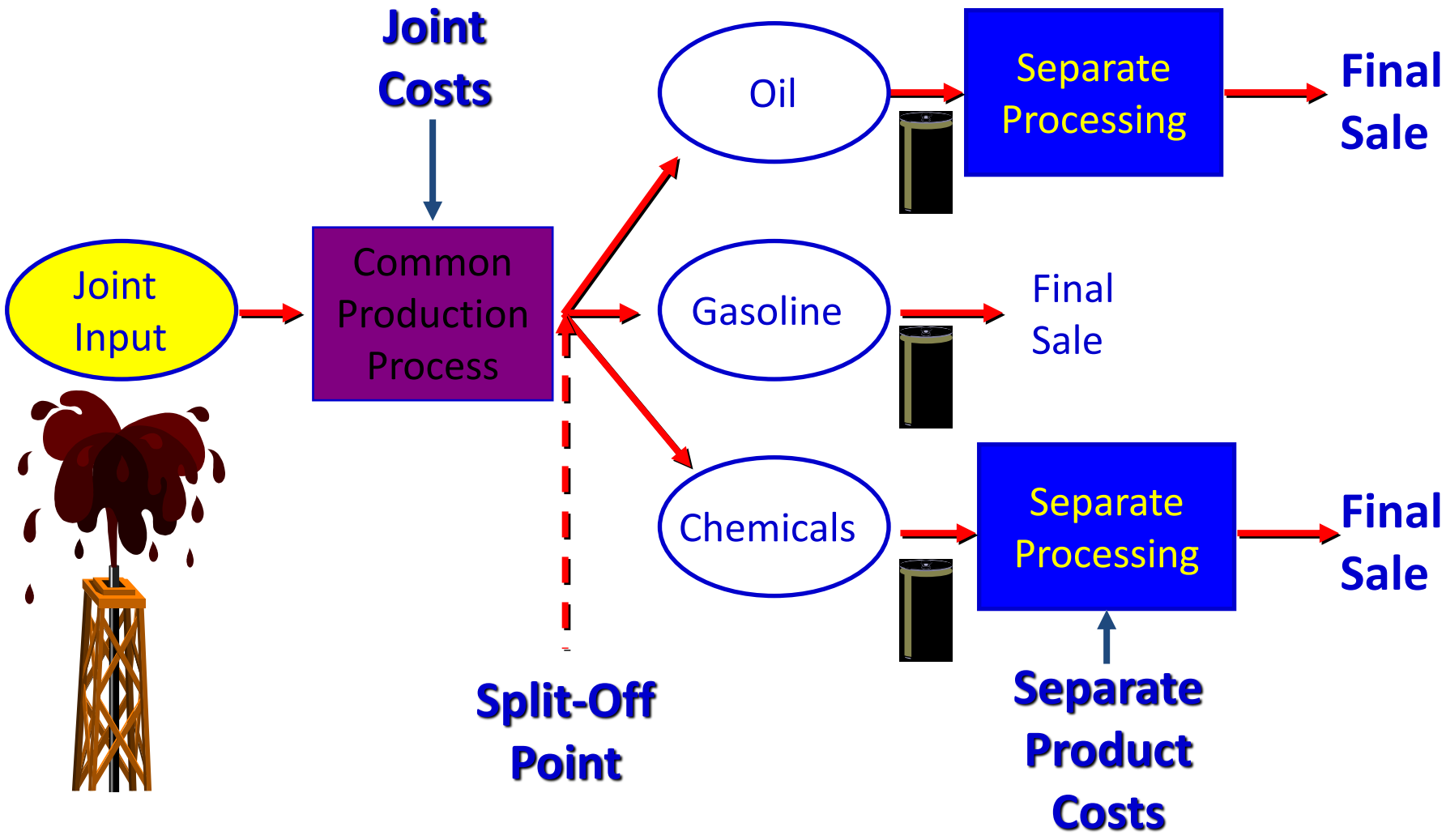
Joint Costs

- 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



Joint Products



The Pitfalls of Allocation

Joint costs are traditionally allocated among different products at the split-off point. A typical approach is to allocate joint costs according to the relative sales value of the end products.

Although allocation is needed for some purposes such as balance sheet inventory valuation, allocations of this kind are very dangerous for decision making.

Sell or Process Further

Joint costs are irrelevant in decisions regarding what to do with a product from the split-off point forward. Therefore, these costs should not be allocated to end products for decision-making purposes.

With respect to sell or process further decisions, it is profitable to continue processing a joint product after the split-off point so long as the incremental revenue from such processing exceeds the incremental processing costs incurred after the split-off point.

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End of the Chapter