Study Unit Seven

Cost Management Concepts

This study unit is the **first of five** on **cost management**. The relative weight assigned to this major topic in Part 1 of the exam is **15%**. The five study units are

- **Study Unit 7: Cost Management Concepts**
- Study Unit 8: Cost Accumulation Systems
- Study Unit 9: Cost Allocation Techniques
- Study Unit 10: Supply Chain Management
- Study Unit 11: Business Process Improvement

This study unit discusses foundational material used in many areas of cost management, budgeting, and performance management. Topics covered in this study unit include

- Variable, fixed, and mixed cost behaviors
- The high-low method
- Cost measurement, including
  - Direct costs versus indirect costs
  - Manufacturing versus nonmanufacturing costs
  - Product costs versus period costs
  - Actual costing versus normal costing
  - Absorption costing versus variable costing

Cost management is at the heart of management accounting. Thus, the CMA exam greatly emphasizes this area of study. The candidate will face many questions involving numerical calculations and others requiring a knowledge of cost terminology and the implications of cost management decisions. There is a strategic value in knowing cost information. For example, costs need to be known for pricing and overhead allocation purposes.

7.1 Cost Management Terminology

Subdisciplines of Accounting

Financial accounting is concerned principally with reporting to external users, usually through a set of financial statements produced in accordance with GAAP. Financial accounting has a historical focus.

Management accounting is concerned principally with reporting to internal users. The management accountant's goal is to produce reports that improve organizational decision making. Management accounting is future-oriented.

Cost accounting supports both financial and management accounting. Information about the cost of resources acquired and consumed by an organization underlies effective reporting for both external and internal users.

- In financial accounting, costing information is used to account for cost of goods sold and inventory in external financial reports.
- In managerial accounting, costing information is used to make decisions about costs, production, budgeting, and pricing.

Basic Cost Definitions

A cost is defined by the IMA in two senses:

- "In financial accounting, the sacrifice measured by the price paid or required to be paid to acquire goods or services. The term 'cost' is often used when referring to the valuation of a good or service acquired. When 'cost' is used in this sense, a cost is an asset. When the benefits of the acquisition (the goods or services) expire, the cost becomes an expense or loss."
- "In management accounting, a measurement in monetary terms of the amount of resources used for some purpose. The term by itself is not operational. It becomes operational when modified by a term that defines the purpose, such as acquisition cost, incremental cost, or fixed cost."

A **cost object** is any object to which costs can be attached. Examples are products, processes, employees, departments, and facilities.

A **cost driver** is the basis used to assign costs to a cost object.

- Cost driver is defined by the IMA as "a measure of activity, such as direct labor hours, machine hours, beds occupied, computer time used, flight hours, miles driven, or contracts, that is a causal factor in the incurrence of cost to an entity."
- The key aspect of a cost driver is the existence of a direct cause-and-effect relationship between the quantity of the driver consumed and the amount of total cost. In other words, a cost driver is some event that causes costs to occur.

Direct vs. Indirect

Costs can be classified by how they are assigned to cost objects.

Direct costs are costs that can be associated with a particular cost object in an economically feasible way, i.e., they can be traced to that object.

- Examples are the direct materials and direct labor inputs to a manufacturing process discussed under Manufacturing vs. Nonmanufacturing below.

Indirect costs are costs that cannot be associated with a particular cost object in an economically feasible way and thus must be allocated to that object.

- Examples are the indirect materials and indirect labor inputs to a manufacturing process discussed on the next page.
- A **cost pool** is an account into which a variety of similar cost elements with a common cause are accumulated. To simplify the allocation process, indirect costs are often collected in cost pools.
  - It is preferable for all the costs in a cost pool to have the same cost driver.
  - Manufacturing overhead, as defined on the next page, is a commonly used cost pool into which various untraceable costs of the manufacturing process are accumulated prior to being allocated.

Common costs are another notable type of indirect cost. A common cost is a cost incurred for the benefit of more than one cost object.

- The key to common costs is that, since they cannot be directly traced to a single cost object, they must be allocated using some systematic and rational basis.
- An example is depreciation or rent on the headquarters building. This is a direct cost when treating the building as a whole, but is a common cost of the departments located in the building, and thus must be allocated when treating the individual departments.

Manufacturing vs. Nonmanufacturing

The costs of manufacturing a product can be classified as one of three types:

1. **Direct materials** are those tangible inputs to the manufacturing process that can practicably be traced to the product, e.g., sheet metal welded together for a piece of heavy equipment.
   - In addition to the purchase price, all costs of bringing raw materials to the production line, e.g., transportation-in, are included in the cost of direct materials.
2. **Direct labor** is the cost of human labor that can practicably be traced to the product, e.g., the wages of the welder.

3. **Manufacturing overhead** consists of all costs of manufacturing that are not direct materials or direct labor.
   - **Indirect materials** are tangible inputs to the manufacturing process that cannot practicably be traced to the product, e.g., the welding compound used to put together a piece of heavy equipment.
   - **Indirect labor** is the cost of human labor connected with the manufacturing process that cannot practicably be traced to the product, e.g., the wages of assembly line supervisors and janitorial staff.
   - **Factory operating costs**, also known as general overhead, include utilities, real estate taxes, insurance, depreciation on factory equipment, etc.

Manufacturing costs are often grouped into the following classifications:

- **Prime cost** equals direct materials plus direct labor, i.e., those costs directly attributable to a product.
- **Conversion cost** equals direct labor plus manufacturing overhead, i.e., the costs of converting raw materials into the finished product.

Costs that are not manufacturing costs are nonmanufacturing costs. The following are the two most common classifications:

1. **Selling (marketing) expenses** are those costs incurred in getting the product from the factory to the consumer, e.g., sales personnel salaries, advertising, and product transportation.
2. **Administrative expenses** are those costs incurred by a company not directly related to producing or marketing the product, e.g., executive salaries, depreciation on the headquarters building, and rent on a warehouse containing inventory.

Product vs. Period

One of the most important classifications a management accountant can make is whether to capitalize a cost as part of finished goods inventory or to expense it as incurred.

- **Product costs** (also called inventoriable costs) are capitalized as part of finished goods inventory. They eventually become a component of cost of goods sold. Such costs include direct materials and direct labor. Product costs also include manufacturing overhead costs under various costing approaches, as discussed in Subunit 7.4.
- **Period costs** are expensed as incurred, meaning they are not capitalized in finished goods inventory and are therefore excluded from cost of goods sold.

7.2 Cost Behavior and Relevant Range

Relevant Range

The relevant range defines the limits within which per-unit variable costs remain constant and fixed costs are not changeable. The relevant range is established by the efficiency of a company's current manufacturing plant, its agreements with labor unions and suppliers, etc.

Variable Costs

Variable costs are a direct function of production volume. They increase when production grows and decrease when production shrinks.

- Raw materials and labor directly involved with production are common variable costs.

Variable cost per unit remains constant in the short run regardless of the level of production.

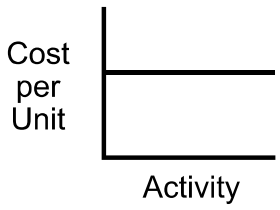

Figure 7-1

Variable costs in total, on the other hand, vary directly and proportionally with changes in volume.

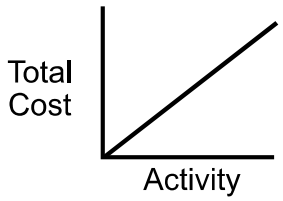

Figure 7-2

Example 7-1 Variable Costs in Total

A company requires one unit of direct material to be used in each finished good it produces.

Number of Outputs Produced	Input Cost per Unit	Total Cost of Inputs
0	$10	$ 0
100	10	1,000
1,000	10	10,000
5,000	10	50,000
10,000	10	100,000

Fixed Costs

Fixed costs remain constant regardless of production.

- Examples of fixed costs include rent, interest, insurance, and lease payments.

Fixed costs in total remain unchanged in the short run regardless of production level, e.g., the amount paid for an assembly line is the same even if production is halted entirely.

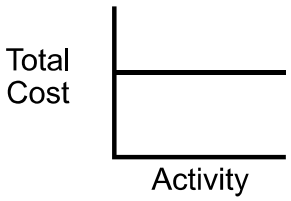

Figure 7-3

Fixed cost per unit, on the other hand, varies indirectly with the activity level.

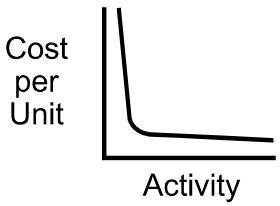

Figure 7-4

Example 7-2 Fixed Cost per Unit

The historical cost of the assembly line is settled, but its cost per unit decreases as production increases.

Number of Outputs Produced	Cost of Assembly Line	Per Unit Cost of Assembly Line
1	$1,000,000	$1,000,000
100	1,000,000	10,000
1,000	1,000,000	1,000
5,000	1,000,000	200
10,000	1,000,000	100

Mixed (Semivariable) Costs

Mixed (semivariable) costs **combine fixed and variable elements**, e.g., rental expense on a car that carries a flat fee per month plus an additional fee for each mile driven.

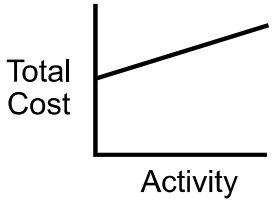

Figure 7-5

Example 7-3 Mixed (Semivariable) Costs

The company rents a piece of machinery to make its production line more efficient. The rental is $150,000 per year plus $1 for every unit produced.

Number of Outputs Produced	Fixed Cost of Extra Machine	Variable Cost of Extra Machine	Total Cost of Extra Machine
0	$150,000	$ 0	$150,000
100	150,000	100	150,100
1,000	150,000	1,000	151,000
5,000	150,000	5,000	155,000
10,000	150,000	10,000	160,000

Two methods of estimating mixed costs are in general use:

1. The **regression (or scattergraph) method** is by far the more complex (and accurate) of the two methods. Regression analysis is covered in detail in Study Unit 12, Subunit 1.
2. The **high-low method** is the less accurate but quicker of the two methods.

High-Low Method

1. The first step in applying the high-low method is to isolate the variable portion of the cost. The difference in cost between the highest and lowest levels of activity for a group of periods is divided by the difference in the cost drivers (activity level) at the two levels (cost drivers are defined under Basic Cost Definitions in Subunit 7.1).

$$\text{Variable portion of mixed cost using high-low method} = \frac{\text{Cost at highest activity level} - \text{Cost at lowest activity level}}{\text{Driver at highest activity level} - \text{Driver at lowest activity level}}$$

2. In the second step, the fixed portion of the cost is calculated by inserting the appropriate values for either the high or low period in the range.

The firm then uses the resulting information to project total cost at any level of activity. The result is an estimated cost formula.

Total cost = Fixed cost + (Variable cost per activity level × Activity level)

Example 7-4 Mixed Cost -- High-Low Method

A company has the following cost data:

Month	Machine Hours	Maintenance Costs
April	1,000	$2,275
May	1,600	3,400
June	1,200	2,650
July	800	1,900
August	1,200	2,650
September	1,000	2,275

$$\text{Variable portion} = \frac{\text{May cost} - \text{July cost}}{\text{May driver} - \text{July driver}} = \frac{\$3,400 - \$1,900}{1,600 - 800} = \frac{\$1,500}{800} = \$1.875 \text{ per machine hour}$$

$$\begin{aligned}\text{Fixed portion} &= \text{Total cost} - \text{Variable portion}\\ &= \$1,900 - (800 \text{ machine hours} \times \$1.875 \text{ per hour})\\ &= \$1,900 - \$1,500\\ &= \$400\end{aligned}$$

An expenditure of 1,300 machine hours will generate a probable total cost of $2,837.50 [$400 + (1,300 × $1.875)].

7.3 Costing Techniques

Actual vs. Normal Costing

Actual costing is the recording of product costs based on actual

- Cost of materials,
- Cost of labor, and
- Overhead incurred.

Actual costing is the most accurate method of accumulating costs in a cost accounting system due to it not including any budget-based amounts. However, it is also the least timely and most volatile method. Because per-unit costs depend on the level of production in a period, large fluctuations arise from period to period. This volatility can lead to the reporting of misleading financial information.

Normal costing is an alternative to actual costing. Under normal costing

- Actual direct materials and actual direct labor are charged to a specific product or production department.
  - This is the same as actual costing.
- Overhead is applied on the basis of a budgeted rate.
  - This differs from actual costing and compensates for the fluctuations in unit cost inherent in actual costing.
  - There is usually a difference between budgeted overhead and actual overhead.
    - If the difference is immaterial, it should be allocated to cost of goods sold.
    - If the difference is material, it should be prorated between cost of goods sold, work-in-process inventories, and finished goods inventories.
    - This calculation of under- or overapplied overhead is covered in detail in Study Unit 9, Subunit 2.

Extended normal costing extends the use of normalized rates to direct material and direct labor, so that all three major input categories use normalized rates.

Cost Accumulation Systems

Job-order costing is appropriate when producing products with individual characteristics or when identifiable groupings are possible. Study Unit 8, Subunit 1, has a detailed explanation.

- Costs are attached to specific "jobs." Each job will result in a single, identifiable end product.
- Examples are any industry that generates custom-built products, such as shipbuilding or a sign shop.

Process costing is used when similar products are mass produced on a continuous basis. Study Unit 8, Subunit 2, has a detailed explanation.

- Costs are attached to specific departments or phases of production. Examples are fence and candy manufacturing.
- Since costs are attached to streams of products rather than individual items, process costing involves calculating an average cost for all units. The two widely used methods are weighted-average and first-in, first-out (FIFO).
- Some units remain unfinished at the end of the period. For each department to adequately account for the costs attached to its unfinished units, the units, called work-in-process, must be restated in terms of equivalent units of production (EUP).

Activity-based costing (ABC) first assigns resource costs to activities. These activity costs are then assigned to physical goods. Study Unit 8, Subunit 3, has a detailed explanation.

- ABC is a response to the distortions of product cost information brought about by peanut-butter costing, which is the inaccurate averaging or spreading of costs like peanut butter over products or service units that use different amounts of resources.

Life-cycle costing emphasizes the need to price products to cover all the costs incurred over the lifespan of a product, not just the immediate costs of production. Study Unit 8, Subunit 4, has a detailed explanation.

- Costs incurred before production, such as R&D and product design, are referred to as **upstream costs**.
- Costs incurred after production, such as marketing and customer service, are called **downstream costs**.

Standard Costing, Flexible Budgeting, and Variance Analysis

Standard costing is a system designed to alert management when the actual costs of production differ significantly from budgeted ("standard") costs. Standard costs are predetermined, attainable unit costs. A standard cost is not just an average of past costs, but an objectively determined estimate of what a cost should be. The cost estimate excludes past inefficiencies and takes into account expected future changes.

- Utilizing standard costs tends to simplify recordkeeping.
- The costs of using standard costing are low relative to using actual costing.
- Standard costs can be used with both job-order and process-costing systems.

Flexible budgeting is the calculation of the quantity and cost of inputs that should have been consumed given the achieved level of production. Flexible budgeting supplements the **static budget**, which is the company's best projection of the resource consumption and levels of output that will be achieved for an upcoming period.

The static and flexible budgets are compared to the actual results, and the differences are calculated.

- These differences are referred to as variances. Preparation of a flexible budget and variances are both covered in detail in Study Unit 15.
- Variance analysis enables **management by exception**, the practice of giving attention primarily to significant deviations from expectations (whether favorable or unfavorable).

7.4 Absorption and Variable Costing

Period vs. Product Costs

Product costs are capitalized costs because they become a component of cost of goods sold. **Period costs** are expensed as incurred, i.e., they are not capitalized in finished goods inventory and are thus excluded from cost of goods sold.

Absorption Costing

For **external reporting purposes**, the cost of a product must include **all** the costs of manufacturing it: direct labor, direct materials, and all factory overhead (both fixed and variable). This method is commonly known as **absorption**, **full costing**, or **full absorption costing**.

Under absorption costing, the fixed portion of manufacturing overhead is "absorbed" into the cost of each unit of product. Thus, product cost includes **all manufacturing costs**, both fixed and variable. The inventoried cost of the product includes **all production costs**, both fixed and variable. This technique is required for external financial reporting and for income tax purposes.

Variable Costing

For **internal purposes**, decision making is improved by treating fixed overhead as a period cost so that only costs that are variable in the short run are included in the cost of the product.

- Fixed overhead costs are considered period costs and deducted in the period in which they are incurred.
- This practice is termed **variable,** or **direct, costing**. Variable costing is the preferred term because it concisely describes what is happening–namely that product costs are based only on variable costs.

Variable costs are a direct function of production volume. They increase when production grows and decrease when production shrinks. Raw materials and labor directly involved with production are common variable costs. Variable costing is used internally to support the decision making of internal users of accounting information.

- Product cost includes only the variable portion of manufacturing costs.
- Fixed manufacturing costs are considered period costs and are expensed as incurred.
- This technique is not allowed for external financial reporting but is very useful for internal decision making. It also stops management from manipulating income by overproducing during the period.

- Variable-basis cost of goods sold and the variable portion of S&A expenses are subtracted from sales to arrive at **contribution margin**.
  - This amount (Sales – Total variable costs) is an important element of the variable costing income statement because it is the amount available for covering fixed costs (both manufacturing and S&A).
  - Contribution margin is an important metric internally but is generally considered irrelevant to external financial statement users.
  - Manufacturing contribution margin considers only the actual costs of manufacturing (i.e., direct materials, direct labor, and variable manufacturing overhead) to be product costs, i.e., inventoriable.

Example 7-5 Contribution Margin Income Statement

Company X sells 20,000 units in the current year at a sales price of $60 per unit. X has the following costs:

Variable costs per unit	
Direct materials	$8
Direct labor	5
Overhead	2
Selling	1

Total fixed costs	
Overhead	$200,000
Selling and administrative	150,000

Company X's contribution margin formatted income statement is prepared as follows:

Sales ($60 × 20,000)		$1,200,000
Less: Variable costs		
Direct materials ($8 × 20,000)	$160,000	
Direct labor ($5 × 20,000)	100,000	
Overhead ($2 × 20,000)	40,000	
Selling ($1 × 20,000)	20,000	(320,000)
Contribution margin		$ 880,000
Less: Fixed costs		
Overhead	$200,000	
Selling and administrative	150,000	(350,000)
Operating income		$ 530,000

Summary of Absorption Costing vs. Variable Costing

The following table summarizes product and period costs under both methods:

	Absorption Costing (Required under GAAP)	Variable Costing (For Internal Reporting Only)
Product Costs (Included in Cost of Goods Sold)	Variable production costs	Variable production costs
	Fixed production costs	
Period Costs (Excluded from Cost of Goods Sold)		Fixed production costs
	Variable S&A expenses	Variable S&A expenses
	Fixed S&A expenses	Fixed S&A expenses

Variable vs. Absorption Costing -- Income Statements

The accounting for variable production costs and fixed S&A expenses is identical under the two methods. The difference lies in the varying treatment of fixed production costs and presentation of variable S&A expenses.

Absorption and variable costing income statements can be illustrated as follows:

Absorption Costing

Sales
– Cost of goods sold:
  Direct materials
  Direct labor
  Variable overhead
  Fixed overhead
= Gross margin
– Total S&A expenses
= Operating income

Variable Costing

Sales
– Variable expenses:
  Direct materials
  Direct labor
  Variable overhead
  Variable S&A expenses
= Contribution margin
– Fixed expenses:
  Fixed overhead
  Fixed S&A expenses
= Operating income

Note that ending finished goods inventory will differ between the two methods due to the different treatment of fixed production costs. This leads to a difference in cost of goods sold and operating income.

Example 7-6 Absorption vs. Variable Costing

		Absorption Costing (Required for ext. rptg.)		Variable Costing (For internal reporting only)	
	Sales		**$100,000**		**$100,000**
	Beg. finished goods inventory	$10,000		$10,000	
Product Costs	Add: Variable production costs	20,000 (a)		20,000 (a)	
	Add: Fixed production costs	30,000 (b)		-	
	Goods available for sale	$60,000		$30,000	
	Minus: End. finished goods inventory	(35,000)		(25,000)	
	Cost of goods sold		**$(25,000)**		**$(5,000)**
	Minus: Variable S&A expenses		-		(10,000) (c)
Period Costs	**Gross margin (abs.) / Contribution margin (var.)**		**$75,000**		**$85,000**
	Minus: Fixed production costs		-		(30,000) (b)
	Minus: Variable S&A expenses		(10,000) (c)		-
	Minus: Fixed S&A expenses		(20,000) (d)		(20,000) (d)
	Operating income		**$45,000**		**$35,000**

Legend	Cost Component
(a)	Variable production costs
(b)	Fixed production costs
(c)	Variable selling and administrative expenses
(d)	Fixed selling and administrative expenses

The $10,000 difference in operating income ($45,000 – $35,000) is the difference between the ending inventory values ($35,000 – $25,000). In essence, the absorption method carries 33.33% of the fixed overhead costs ($30,000 × 33.33% = $10,000) on the balance sheet as an asset because 33.33% of the month's production is still in inventory.

Example 7-7 Absorption Costing vs. Variable Costing

Fordice Company produces and sells one product. In the first year of operations, Fordice's costs were as follows:

Direct materials per unit	$7.00
Direct labor per unit	3.00
Variable overhead cost per unit	1.50
Variable selling cost per unit	1.00

Fixed manufacturing overhead cost for the year totaled $400,000. Fixed selling and administrative cost for the year totaled $175,000.

During this year of operations, Fordice produced 200,000 units and sold 180,000 units at $40 each.

ABSORPTION COSTING RESULTS:

Unit product cost = $7 DM + $3 DL + $1.50 VOH + $2 FOH* = $13.50 per unit

*FOH per unit = $400,000 ÷ 200,000 units produced = $2

External Financial Statements (in accordance with GAAP)

Ending inventory on balance sheet = 20,000 units × $13.50 = $270,000

Income Statement	
Sales (180,000 units × $40)	$7,200,000
Less: Cost of goods sold (180,000 × $13.50)	2,430,000
Gross profit	$4,770,000
Selling and administrative expenses [(180,000 × $1) + 175,000]	355,000
Operating income	$4,415,000

VARIABLE COSTING RESULTS:

Unit product cost = $7 DM + $3 DL + $1.50 VOH = $11.50 per unit

Income Statement	
Sales (180,000 units × $40)	$7,200,000
Less: Variable expenses:	
Variable cost of goods sold (180,000 × $11.50)	2,070,000
Variable selling (180,000 × $1.00)	180,000
Contribution margin	$4,950,000
Less: Fixed expenses:	
Fixed overhead	400,000
Fixed selling and administrative	175,000
Operating income	$4,375,000

Example 7-8 Absorption Costing vs. Variable Costing Reconciliation

Reconciliation of the results from Example 7-7:

Year 1 Reconciliation (Production > Sales)	
Variable costing operating income	$4,375,000
Add: FOH absorbed in ending inventory	
20,000 units × $2.00 FOH per unit	40,000
Absorption costing operating income	$4,415,000

Effects on Operating Income

As production and sales levels change, the two methods have varying effects on operating income.

- When everything produced during a period is sold that period, the two methods report the same operating income.
  - Total fixed costs budgeted for the period are charged to sales revenue in the period under both methods.
- When production and sales are not equal for a period, the two methods report different operating income.

Scenario	Absorption Costing	Variable Costing	Result
Production > Sales and Ending inventory increases	Some fixed costs are absorbed in ending inventory	All fixed costs are expensed	Absorption costing operating income > Variable costing operating income
Production < Sales and Ending inventory decreases	Some fixed costs embedded in beginning inventory are expensed (released) in the current period	Only current period fixed costs are expensed	Absorption costing operating income < Variable costing operating income

Many companies prefer variable costing for internal reporting because of the incentive inherent in absorption costing. The main advantage of variable costing is that income cannot be manipulated by management action.

Under absorption costing, whenever production exceeds sales, fewer fixed costs are expensed under the absorption basis, and operating income always increases. A production manager can thus **increase absorption-basis operating income merely by increasing production**, whether there is any customer demand for the additional product or not. The company must also deal with the increased carrying costs resulting from swelling inventory levels. This practice, called producing for inventory, can be effectively discouraged by using variable costing for performance reporting and consequent bonus calculation.

Example 7-9 Absorption Costing vs. Variable Costing Reconciliation -- Subsequent Years

Using the data from Example 7-7, assume in Year 2 that production is again 200,000 units and that sales are only 150,000 units.

ABSORPTION COSTING RESULTS -- YEAR 2:

Year 2's ending inventory = 20,000 Year 1 ending + 50,000 from Year 2 = 70,000 units

70,000 units × $13.50 per unit = $945,000

Income Statement	
Sales (150,000 units × $40)	$6,000,000
Less: Cost of goods sold (150,000 × $13.50)	2,025,000
Gross profit	$3,975,000
Selling and administrative expenses [(150,000 × $1) + 175,000]	325,000
Operating income	$3,650,000

VARIABLE COSTING RESULTS -- YEAR 2:

Unit product cost = $7 DM + $3 DL + $1.50 VOH = $11.50 per unit

Income Statement	
Sales (150,000 units × $40)	$6,000,000
Less: Variable expenses:	
Variable cost of goods sold (150,000 × $11.50)	1,725,000
Variable selling (150,000 × $1.00)	150,000
Contribution margin	$4,125,000
Less: Fixed expenses:	
Fixed overhead	400,000
Fixed selling and administrative	175,000
Operating income	$3,550,000

Year 2 Reconciliation (Production > Sales)

Variable costing operating income	$3,550,000
Add: FOH absorbed in ending inventory 50,000 units × $2.00 FOH per unit	100,000
Absorption costing operating income	$3,650,000

Assume that in Year 3, the company produces 200,000 units and sells 240,000 units.

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Example 7-9 -- Continued

ABSORPTION COSTING RESULTS -- YEAR 3:

Year 3's ending inventory = 70,000 Year 2 ending – 40,000 from Year 3 = 30,000 units

30,000 units × $13.50 per unit = $405,000

Income Statement	
Sales (240,000 units × $40)	$9,600,000
Less: Cost of goods sold (240,000 × $13.50)	3,240,000
Gross profit	$6,360,000
Selling and administrative expenses [(240,000 × $1) + 175,000]	415,000
Operating income	$5,945,000

VARIABLE COSTING RESULTS -- YEAR 3

Unit product cost = $7 DM + $3 DL + $1.50 VOH = $11.50 per unit

Income Statement	
Sales (240,000 units × $40)	$9,600,000
Less: Variable expenses:	
Variable cost of goods sold (240,000 × $11.50)	2,760,000
Variable selling (240,000 × $1.00)	240,000
Contribution margin	$6,600,000
Less: Fixed expenses:	
Fixed overhead	400,000
Fixed selling and administrative	175,000
Operating income	$6,025,000

Year 3 Reconciliation (Production < Sales)

Variable costing operating income	$6,025,000
Less: FOH released from ending inventory 40,000 units × $2.00 FOH per unit	(80,000)
Absorption costing operating income	$5,945,000

Example 7-10 Extended Example of Absorption and Variable Operating Income

A company has the following sales and cost data:

	Year 1	Year 2	Year 3
Production in units	40,000	50,000	0
Sales in units	30,000	30,000	30,000
Ending inventory in units (Wgt. Avg.)	10,000	30,000	0
Unit sales price	$ 1.00		
Unit variable cost	0.50		
Fixed manufacturing costs	4,000	per year	
Variable S&A expenses	0.03	per unit	
Fixed S&A expenses	1,000	per year	

Compare the 3-year income statements prepared under the two methods:

Absorption Costing (Required for external reporting)

	Year 1	Year 2	Year 3
Sales	**$30,000**	**$30,000**	**$30,000**
Beginning inventory	$ 0	$ 6,000	$17,500
Variable mfg. costs	20,000	25,000	0
Fixed mfg. costs	4,000	4,000	4,000
Goods available for sale	$24,000	$35,000	$21,500
Less: Ending inventory*	(6,000)	(17,500)	0
Absorption COGS	**$18,000**	**$17,500**	**$21,500**
Gross margin	**$12,000**	**$12,500**	**$ 8,500**
Variable S&A expenses	(900)	(900)	(900)
Fixed S&A expenses	(1,000)	(1,000)	(1,000)
Operating income	**$10,100**	**$10,600**	**$ 6,600**

Variable Costing (For internal reporting only)

	Year 1	Year 2	Year 3
Sales	**$30,000**	**$30,000**	**$30,000**
Beginning inventory	$ 0	$ 5,000	$15,000
Variable mfg. costs	20,000	25,000	0
Goods available for sale	$20,000	$30,000	$15,000
Less: Ending inventory	(5,000)	(15,000)	0
Variable COGS	**$15,000**	**$15,000**	**$15,000**
Variable S&A exps.	(900)	(900)	(900)
Contribution margin	**$14,100**	**$14,100**	**$14,100**
Fixed mfg. costs	(4,000)	(4,000)	(4,000)
Fixed S&A expenses	(1,000)	(1,000)	(1,000)
Operating income	**$ 9,100**	**$ 9,100**	**$ 9,100**

* Ending inventory is calculated on the weighted-average basis. The use of FIFO would result in slightly different numbers in Year 2 under the absorption method, but the impact would be the same.

Note that, assuming zero inventory at the beginning of Year 1 and at the end of Year 3, the total operating income for the 3-year period is the same under either costing method.

	Absorption Costing	Variable Costing
Year 1	$10,100	$ 9,100
Year 2	10,600	9,100
Year 3	6,600	9,100
3-Year Total	**$27,300**	**$27,300**

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Example 7-10 -- Continued

Absorption costing shows a higher operating income than variable costing in Years 1 and 2 because fixed overhead has been capitalized and does not get expensed until Year 3. Variable costing, on the other hand, treats fixed overhead as an expense of the period in which the cost is incurred. In Year 2, despite the same cash flow, there is a $1,500 difference between the final operating income figures. There is an even greater difference in Year 3.

If fixed costs increase relative to variable costs, the differences become more dramatic (here, 50% of the selling price is variable manufacturing cost, and fixed overhead is no more than 20% of the variable manufacturing cost).

From an internal point of view, a manager can manipulate absorption income by changing production levels. But, with variable costing, a manager cannot manipulate it simply by changing production levels.

Note that, under the absorption method, management was able to show higher incomes in Years 1 and 2 by overproducing. If the manager was being given a bonus for a higher level of income, (s)he could obtain the bonus by producing more units than could be sold. As a result, some fixed costs would be added to the balance sheet as inventories. Thus, the income statement and balance sheet both look good, despite the fact that the production manager has done a bad thing: (S)he has produced excessive inventories that require the company to incur storage and financing costs. Spoilage may also be a result.

Summary of Effects on Income and Ending Inventory

The value of ending inventory is **never** higher under variable costing than it is under absorption costing because fixed manufacturing costs are not included in inventory under variable costing.

Income and inventory levels will differ whenever sales and production differ.

- Income will be higher or lower under variable costing depending upon whether inventories are increased during the period or liquidated.
- If inventories increase during a period, the variable costing method will show a lower income because all fixed costs are being subtracted on the income statement, while under the absorption method, some fixed costs are being capitalized as inventories.
- Variable costing will show a higher income in periods when inventories decline because the absorption method forces the subtraction of current period fixed costs included in inventory sold, plus some fixed costs incurred (and capitalized) in prior periods.

Under variable costing, profits always move in the same direction as sales volume. Profits reported under absorption costing behave erratically and sometimes move in the opposite direction from sales trends.

In the long run, the two methods will report the same total profits if sales equal production. The inequalities between production and sales are usually minor over an extended period.

Benefits of Variable Costing

Although the use of variable costing for external financial statements is prohibited, most agree about its superiority for internal reporting. It is far better suited than absorption costing to the needs of management.

- Management requires a knowledge of cost behavior under various operating conditions. For planning and control, management is more concerned with treating fixed and variable costs separately than with calculating full costs.
- Under variable costing, the cost data for profit planning and decision making are readily available from accounting records and statements. For example, cost-volume-profit relationships and the effects of changes in sales volume on net income can easily be computed from the income statement prepared under the variable costing concept, but not from the conventional absorption cost income statement based on the same data.
- Profits and losses reported under variable costing have a relationship to sales revenue and are not affected by inventory or production variations.
  - Absorption cost income statements may show decreases in profits when sales are rising and increases in profits when sales are decreasing, which may be confusing to management.
  - Under variable costing, cost of goods sold will vary directly with sales volume, and the influence of production on gross profit is avoided. Under the variable costing method, a production manager cannot manipulate sales by overproducing.
- The full impact of fixed costs on net income, partially hidden in inventory values under absorption costing, is emphasized by the presentation of costs on an income statement prepared under variable costing.
- Proponents of variable costing maintain that fixed factory overhead is more closely correlated to capacity to produce than to the production of individual units.
- Variable costing is also preferred over absorption costing for studies of relative profitability of products, territories, and other segments of a business. It concentrates on the contribution that each segment makes to the recovery of fixed costs that will not be altered by decisions to make and sell. Under variable costing procedures,
  - The marginal income concept leads to better pricing decisions, which are a principal advantage of variable costing.
  - The impact of fixed costs on net income is emphasized by showing the total amount of such costs separately in financial reports.