Prerequisite Reading 18: Inventories

The main reading Analysis of Inventories is a direct repeat of four of the prerequisite LOS found below – 18.d, 18.g, 18.h and 18.i. There is no new material which will be covered in the main reading beyond this prerequisite. It would be sensible to cover the full content here including those repeated LOS, to ensure you are happy with the bigger picture. For example, you will only be able to understand and answer questions on LOS 18.d once you have got to grips with LOS 18.b and LOS 18.c. When you then come onto Analysis of Inventories, you will be able to use it as a way to recap and test your knowledge. Beyond those four repeated LOS, it is important to understand how inventory impacts the income statement and balance sheet, with a particular focus on the impact of the choice of valuation method (namely LIFO and FIFO).

MODULE 18.1: COST FLOW METHODS

Merchandising firms, such as wholesalers and retailers, purchase inventory that is ready for sale. In this case, inventory is reported in one account on the balance sheet. Manufacturing firms normally report inventory using three separate accounts: raw materials, work-in-process, and finished goods.

Cost of goods sold (COGS), also referred to as cost of sales (COS) under IFRS, is related to the beginning balance of inventory, purchases, and the ending balance of inventory. The relationship is summarized in the following equation:

COGS = beginning inventory + purchases – ending inventory

This equation can be rearranged to solve for any of the four variables:

purchases = ending inventory − beginning inventory + COGS

beginning inventory = COGS − purchases + ending inventory

ending inventory = beginning inventory + purchases − COGS

PROFESSOR'S NOTE

Many candidates find the inventory equation easiest to remember in this last form. If you start with beginning inventory, add the goods that came in (purchases), and subtract the goods that went out (COGS), the result must be ending inventory.

LOS 18.a: Contrast costs included in inventories and costs recognized as expenses in the period in which they are incurred.

Cost is the basis for most inventory valuation. The main issue involves determining the amounts that should be included in cost.

The costs included in inventory are similar under IFRS and U.S. GAAP. These costs, known as **product costs**, are capitalized in the Inventories account on the balance sheet and include:

- Purchase cost less trade discounts and rebates.
- Conversion (manufacturing) costs including labor and overhead.
- Other costs necessary to bring the inventory to its present location and condition.

By capitalizing inventory cost as an asset, expense recognition is delayed until the inventory is sold and revenue is recognized.

Not all inventory costs are capitalized; some costs are expensed in the period incurred. These costs, known as **period costs**, include:

- Abnormal waste of materials, labor, or overhead.
- Storage costs (unless required as part of production).
- Administrative overhead.
- Selling costs.

EXAMPLE: Costs included in inventory

Vindaloo Company manufactures a single product. The following information was taken from the company's production and cost records last year:

Units produced	5,000
Raw materials	$15,000
Conversion cost for finished goods	$20,000
Freight-in to plant	$800
Storage cost for finished goods	$500
Abnormal waste	$100
Freight-out customers	$1,100

Assuming no abnormal waste is included in conversion cost, calculate the capitalized cost of one unit.

Answer:

Capitalized inventory cost includes the raw materials cost, conversion cost, and freight-in to plant, as follows:

Raw materials	$15,000	
Conversion cost	$20,000	
Freight-in to plant	$800	
Total capitalized cost	$35,800	
Units produced	5,000	
Capitalized cost per unit	$7.16	($35,800 / 5,000 units)

The storage cost, abnormal waste, and the freight-out to customers are expensed as incurred.

LOS 18.b: Describe different inventory valuation methods (cost formulas).

If the cost of inventory remains constant over time, determining the firm's COGS and ending inventory is simple. To compute COGS, simply multiply the number of units sold by the cost per unit. Similarly, to compute ending inventory, multiply the number of units remaining by the cost per unit.

However, it is likely that the cost of purchasing or producing inventory will change over time. As a result, firms must select a cost flow method (known as the *cost flow assumption* under U.S. GAAP and *cost flow formula* under IFRS) to allocate the inventory cost to the income statement (COGS) and the balance sheet (ending inventory).

Under IFRS, the permissible methods are:

- Specific identification.
- First-in, first-out.
- Weighted average cost.

U.S. GAAP permits these same cost flow methods, as well as the last-in, first-out (LIFO) method. LIFO is not allowed under IFRS.

A firm can use one or more of the inventory cost flow methods. However, the firm must employ the same cost flow method for inventories of similar nature and use.

Under the **specific identification** method, each unit sold is matched with the unit's actual cost. Specific identification is appropriate when inventory items are not interchangeable and is commonly used by firms with a small number of costly and easily distinguishable items such as jewelry. Specific identification is also appropriate for special orders or projects outside a firm's normal course of business.

Under the **first-in, first-out** (FIFO) method, the first item purchased is assumed to be the first item sold. The advantage of FIFO is that ending inventory is valued based on the most recent purchases, arguably the best approximation of current cost. Conversely, FIFO COGS is based on the earliest purchase costs. In an inflationary environment, COGS will be understated compared to current cost. As a result, earnings will be overstated.

Under the **last-in, first-out** (LIFO) method, the item purchased most recently is assumed to be the first item sold. In an inflationary environment, LIFO COGS will be higher than FIFO COGS, and earnings will be lower. Lower earnings translate into lower income taxes, which increase cash flow. Under LIFO, ending inventory on the balance sheet is valued using the earliest costs. Therefore, in an inflationary environment, LIFO ending inventory is less than current cost.

PROFESSOR'S NOTE

The income tax advantages of using LIFO explain its popularity among U.S. firms. The tax savings result in the peculiar situation where lower reported earnings are associated with higher cash flow from operations.

Weighted average cost is a simple and objective method. The average cost per unit of inventory is computed by dividing the total cost of goods available for sale (beginning inventory + purchases) by the total quantity available for sale. To compute COGS, the average cost per unit is multiplied by the number of units sold. Similarly, to compute ending inventory, the average cost per unit is multiplied by the number of units that remain.

During inflationary or deflationary periods, the weighted average cost method will produce an inventory value between those produced by FIFO and LIFO.

Figure 18.1: Inventory Cost Flow Comparison

Method	Assumption	Cost of Goods Sold Consists of…	Ending Inventory Consists of…
FIFO (U.S. and IFRS)	The items first purchased are the first to be sold.	first purchased	most recent purchases
LIFO (U.S. only)	The items last purchased are the first to be sold.	last purchased	earliest purchases
Weighted average cost (U.S. and IFRS)	Items sold are a mix of purchases.	average cost of all items	average cost of all items

LOS 18.c: Calculate and compare cost of sales, gross profit, and ending inventory using different inventory valuation methods and using perpetual and periodic inventory systems.

The following example demonstrates how to calculate COGS and ending inventory using the FIFO, LIFO, and weighted average cost flow methods.

EXAMPLE: Inventory cost flow methods

Use the inventory data in the following figure to calculate the cost of goods sold and ending inventory under the FIFO, LIFO, and weighted average cost methods.

Inventory Data

January 1 (beginning inventory)	2 units @ $2 per unit =	$4
January 7 purchase	3 units @ $3 per unit =	$9
January 19 purchase	5 units @ $5 per unit =	$25

Cost of goods available	10 units	$38
Units sold during January	7 units	

Answer:

FIFO cost of goods sold. Value the seven units sold at the unit cost of the first units purchased. Start with the earliest units purchased and work down, as illustrated in the following figure.

FIFO COGS Calculation

From beginning inventory	2 units @ $2 per unit =	$4
From first purchase	3 units @ $3 per unit =	$9
From second purchase	2 units @ $5 per unit =	$10
FIFO cost of goods sold	7 units	$23
Ending inventory	3 units @ $5 =	$15

LIFO cost of goods sold. Value the seven units sold at the unit cost of the last units purchased. Start with the most recently purchased units and work up, as illustrated in the following figure.

LIFO COGS Calculation

From second purchase	5 units @ $5 per unit =	$25
From first purchase	2 units @ $3 per unit =	$6
LIFO cost of goods sold	7 units	$31
Ending inventory	2 units @ $2 + 1 unit @ $3 =	$7

Average cost of goods sold. Value the seven units sold at the average unit cost of goods available.

Weighted Average COGS Calculation

Average unit cost	$38 / 10 =	$3.80 per unit
Weighted average cost of goods sold	7 units @ $3.80 per unit =	$26.60
Ending inventory	3 units @ $3.80 per unit =	$11.40

Summary

Inventory system	COGS	Ending Inventory
FIFO	$23.00	$15.00
LIFO	$31.00	$7.00
Average cost	$26.60	$11.40

Note that prices and inventory levels were rising over the period and that purchases during the period were the same for all cost flow methods.