

Will RFID Change Inventory Assumptions?

The word "RFID" is written in a large, bold, orange font. The letter "D" is partially overlaid by a target graphic consisting of three concentric circles and a central yellow dot. The word "Will" is in a smaller, blue font to the left of "RFID". The words "Change Inventory Assumptions?" are in a large, blue font below "RFID".

Perhaps in a few years when prices are lower and the technology is more common.

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al-Mart made headlines when it announced that it would require its top suppliers to place Radio Frequency Identification (RFID) tags on all their cases and pallets shipped to the retailer. This technology currently gives businesses

the capability to track goods throughout the entire supply chain, yet only 10% of organizations use it. That number is expected to grow to more than 40% by 2010 as costs of this technology begin to decline. As the technology becomes more common, several of our assumptions about inventory may change, including valuation. At first glance, the RFID's ability to allow for specific identification of high-volume items would appear to improve the accuracy of inventory costing. But it also adds the potential for abuse.

To examine these potential abuses, we'll first look at the RFID technology, summarize the basic inventory costing



methods, and explore the use of specific identification using RFID and its impact on inventory assumptions.

RFID COMPONENTS

An RFID system consists of three main components: a tag, a transceiver or reader, and a computer system. Typical RFID tags are made of a microchip attached to a radio antenna that is then surrounded by some form of casing, usually plastic. The chips inside the tag can usually store up to two kilobytes of information ranging from date of manufacture to product cost. Tags are applied to the product using an adhesive or may be embedded into the product's packaging.

RFID transceivers provide the mode of communication between the tag and the computer system. Most readers have three main components. The first component transmits the electromagnetic field to produce the

energy needed to power the tags and emit radio waves. The device that actually reads the tag's information is the second component. Third, readers need a decoder to convert the information into digital format.

The computer system or middleware is often the most critical component. Since a reader has the capability to read one single tag up to 100 times per second, the computer software must filter the data properly and store only relevant information in the system. There are several middleware programs to serve different functions of the RFID system. The basic program is the one that actually filters the information. Others monitor the system's operation, send software upgrades when needed, reconfigure the system, and monitor its overall health. Middleware programs may also be adapted to fit specific industry needs as well as to confirm shipment and receipt of products.

The RFID's capabilities are limitless, yet not many organizations are implementing these systems. The biggest reason for the lack of interest has always been cost. The cheapest tags are generally around \$0.20 for the simple, passive tags—those that don't contain a battery and whose power is supplied by the reader. The more capable, active tags—those that contain a battery that can be used as a partial or complete source of power for the tag—can cost anywhere from \$10 to \$50 (or higher). The price of a dumb reader is generally no less than \$500, and intelligent readers can cost up to \$3,000. Generally, the most expensive component in the system is the computer software, with major retailers paying approximately \$200,000 for a system that meets their requirements. The price of these systems varies widely, however, based on the number of locations using RFID. Companies also have to consider other costs, such as testing tags, tag failures, and training employees.

Although companies look at all component costs, tags have always garnered the most attention since they must be produced constantly and typically aren't reusable. With Wal-Mart's recent push to use RFID throughout its supply chain, there may soon be a downward shift in cost. Manufacturers have generally set the price target at \$0.05 per tag because many people think that, at this price, most companies will be more willing to implement RFID systems throughout their organization and supply chain. Tag producers feel that the cost will come down once demand for the product rises.

As Wal-Mart and other large companies adopt this technology, there should be greater acceptance by all organizations. But at current market prices, companies are only applying tags to cases and pallets of inventory.

Table 1 Inventory-Valuation Methods

COSTING METHOD	MANAGERIAL DECISION MAKING	TAX LIABILITY	FINANCIAL REPORTING
Weighted Average Cost	<ul style="list-style-type: none"> ◆ Easy to apply ◆ Doesn't relate to physical flow of inventory ◆ Low level of manipulation 	<ul style="list-style-type: none"> ◆ No advantage or disadvantage ◆ No manipulation 	<ul style="list-style-type: none"> ◆ Doesn't provide a clear picture as to physical flow or costs
FIFO	<ul style="list-style-type: none"> ◆ Generally approximates physical flow ◆ Low level of manipulation 	<ul style="list-style-type: none"> ◆ Leaves company at a disadvantage: lowest costs are used first ◆ Low manipulation 	<ul style="list-style-type: none"> ◆ Properly reflects ending inventory ◆ Doesn't properly match revenue to costs
LIFO	<ul style="list-style-type: none"> ◆ Doesn't reflect physical flow of inventory ◆ Low level of manipulation 	<ul style="list-style-type: none"> ◆ Great advantage: lowers income and ending inventory when prices are rising ◆ Defers taxes 	<ul style="list-style-type: none"> ◆ Understates ending inventory ◆ Matches costs to revenues ◆ Doesn't reflect physical flow
Specific Identification (RFID)	<ul style="list-style-type: none"> ◆ Reflects actual physical and cost flow ◆ Easily manipulated 	<ul style="list-style-type: none"> ◆ No real advantage or disadvantage ◆ Proper estimate of tax liability ◆ Easily manipulated 	<ul style="list-style-type: none"> ◆ Optimal objective for reporting ◆ May create a cookie jar reserve

Once the price drops, companies will begin putting tags on individual items, which will force them to reconsider the current assumptions regarding inventory practices. Let's examine some of these assumptions.

BASIC INVENTORY COSTING METHODS

In 1953, Accounting Research Bulletin No. 43, "Restatement and Revision of Accounting Research Bulletins," addressed the issue of inventory cost-flow assumptions. It discussed that the inventory-valuation method chosen (specific identification, first-in first-out [FIFO], last-in first-out [LIFO], or weighted average cost) should be the one that most clearly reflects periodic income (see Table 1). It made the point that since similar goods are purchased at different times and costs, specific identification and proper matching of costs to sales is often very expensive and impractical. ARB No. 43 also stated that the costing method didn't have to match the actual flow of goods through the organization. It concluded that, based on all these factors, specific identification wouldn't be required. With the declining cost of RFID, however, and considering it will be used primarily for other inventory-management functions, the incremental cost of using RFID for inventory costing will be negligible. Therefore, it may be time to rethink these costing assumptions.

It's well known that specific identification matches actual product costs, while FIFO costing generally pro-

vides the next best approximation of actual product flow. This means that FIFO gives management a good basis for decision making in regard to cost of inventory because it reflects the actual price of ending inventory more properly. FIFO also doesn't easily allow for manipulation of costs. Since management must use the cost of the oldest products in inventory, the company is at a disadvantage when dealing with tax costs. As the oldest products generally have the lowest cost, the company is left paying higher taxes. Another downfall to using FIFO is that it may distort gross profit somewhat. Since the newest sales are matched with the oldest inventory, the costs aren't properly matched. FIFO, which is often used for internal reporting, is generally favored when management's objec-

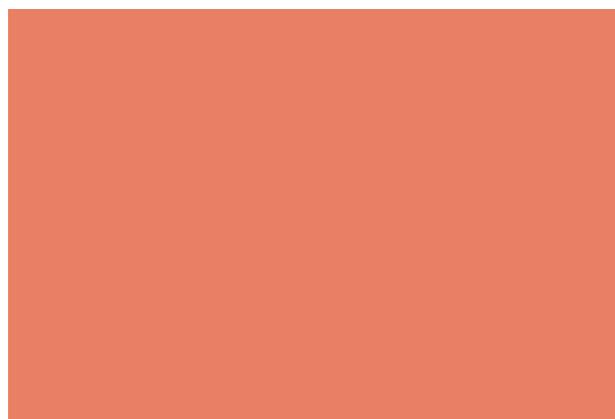
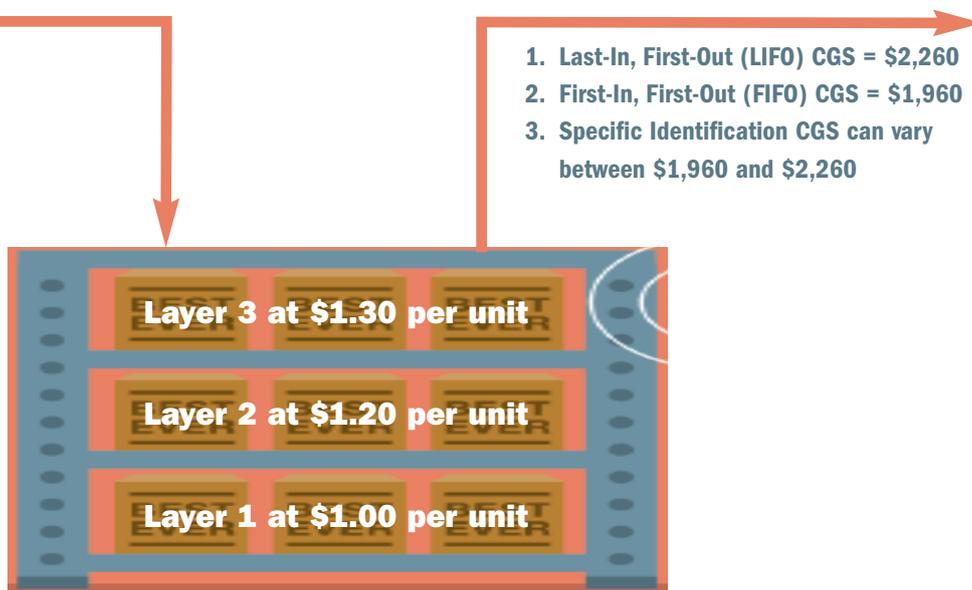


Figure 1: Inventory Layer Container Illustration

Purchases: Varying Costs

Cost of Goods Sold



tive is to show a good approximation of the actual flow of inventory.

Much like FIFO, average cost is a preferred method for internal reporting because it's simple to apply. Again, there's a low level of manipulation since all sales are lumped together throughout the period, giving management a fair representation of cost. But this method doesn't provide an accurate representation of the actual flow of inventory and its related costs. Like FIFO, average cost doesn't give a clear picture of gross profit since sales and costs aren't properly matched.

Companies generally prefer LIFO for use in external reporting because it gives a better picture of gross profit by matching new revenues with new costs. LIFO also gives the greatest tax advantage. Since new inventory generally has a higher cost, LIFO will inflate cost of goods sold and therefore reduce a company's tax liability. Yet LIFO has several flaws in regard to management decision making. Of all the methods, it gives the poorest estimation of the physical flow of inventory because businesses generally sell older inventory first. This difference between LIFO's assumption of cost flow and the actual flow of goods understates ending inventory since newer goods are generally still on hand. As a result, LIFO isn't widely used for internal reporting.

Specific identification, unlike other methods, provides the optimal objective of financial reporting. Each individual purchase is matched to a specific item cost, providing

perfect matching and a clear representation of profit.

Also, managerial decisions are based on the exact flow of the inventory since it's now possible to identify the costs of inventory still on hand as well as those for inventory that has been sold. This also gives an accurate representation of tax liability since no estimation of product flow has been used. On the surface, then, it would seem that those companies using RFID systems should switch to specific identification. Previously, the capability to track individual items was available only to big-ticket sellers like car dealerships, but individual items may be tracked as the cost per tag decreases.

PRODUCT-FLOW MANIPULATION

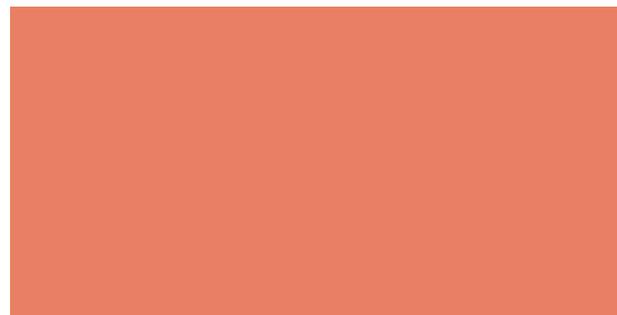
There's a major problem, however, with specific identification, which is the ability to manipulate product flow. There are two areas where product-flow manipulation may cause problems. The first is that it will allow companies to create a cookie jar reserve with their inventory. Cookie jar reserves are hidden accounts that let an organization adjust either quarterly or yearly earnings. Usually, an expense account that relies on an estimate, like bad debt expense, can be raised in good years to lower earnings in the current period. This account can then be lowered in another period where earnings appear to be low. With specific identification, the same problem can be created. Companies can purchase lots of lower-priced inventory and hold them in reserve. Either when sales slow or

extra revenue is needed, they can use these lower-priced items to decrease cost of goods sold, effectively boosting earnings.

The other area of concern with using specific identification is in the manipulation of the tax liability. In much the same way that a company creates a cookie jar reserve for financial reporting, it may use inventory to reduce its tax liability. By tracking individual items, management can easily see where the high- and low-priced goods are. Many corporations use FIFO for the physical flow of inventory, so older products are usually brought to the front of the shelves or brought to the front of a warehouse. Generally, though, older products have a lower cost as prices trend upward. By interrupting the usual product flow and bringing newer products to the front, management can raise expenses and lower the tax liability.

Figure 1 depicts purchases of inventory layered by dates of purchase. The impact of this example would be multiplied across all items an organization carries in inventory. Let's assume that we sell 180 units. The cost of goods sold under LIFO would be 100 units at \$1.30 per unit and 80 units at \$1.20 per unit, resulting in a total of \$2,260 for cost of goods sold. We calculate this based on an assumed inventory flow rather than on actual flow. Using the same example of 180 units sold, the FIFO example results in a cost-of-goods-sold calculation of 100 units at \$1.00 per unit and 80 units at \$1.20 per unit for a total cost of goods sold of \$1,960. With specific identification, we could basically select the layer that we sell from. For example, we could sell 60 units from each of the three layers, with a cost of goods sold of 60 units at \$1.30 per unit, 60 units at \$1.20 per unit, and 60 units at \$1.00, resulting in a total cost of goods sold of \$2,100. Or by controlling the physical flow of goods, we could select any number of different combinations from the various layers to arrive at a total cost of goods sold ranging from \$1,960 to \$2,260—thereby raising or lowering expenses.

In current practice, management is free to change its cost-flow assumptions as it wants since the physical flow isn't a determining cost factor. According to Statement of Financial Accounting Standards No. 154 (SFAS No. 154), "Accounting Changes and Error Corrections—a replacement of APB Opinion No. 22 and FASB Statement No. 3," this switch would represent a change in accounting principle, which would require a company to provide comparative information for prior years based on the new method. Thus users are alerted as to how the changes affect the financial statements. With specific identification, though, the physical and cost flows are identical.



When the physical flow changes, so does the cost-flow assumption. Since there's no guidance regarding specific identification and the physical flow, this change would go unreported in the financial statements and, thereby, go undetected by the public. Currently, by using specific identification, management would be able to control earnings without comparative statements.

A FAR SUPERIOR OPTION

With RFID, our assumptions about inventory valuation and cost flow are changing. Because specific identification was considered cost prohibitive and impractical, specific standards haven't been developed to provide accountants with adequate guidelines to control application of this method. But that may eventually happen.

As the price per tag continues to drop, more companies will move toward using RFID technology, and those with systems currently in place will begin to move its use from pallets of items to individual ones. With this shift, companies will be able to use the specific identification method of inventory costing, and, when used correctly, this method is far superior to the estimations used in current practice. Since it represents the actual flow of both the physical inventory and its cost, specific identification provides a clear picture for financial reporting, tax liability, and managerial decision making. ■

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