

RFID

THE CHANGES IT WILL BRING

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THE YEAR IS 2054. A fugitive walks into the Gap to buy some clothes for his companion. A retinal scanner reads his eyes upon entry, and a nearby holographic image says: “Hello, Mr. Yakimoto. Welcome back to the Gap. How’d those assorted tank tops work out for you?” This is a scene from *Minority Report* starring Tom Cruise. It’s science fiction. Or is it?

Radio Frequency Identification (RFID) promises to make this scenario more science than fiction—and sooner than you might think. As RFID moves into the mainstream, technologies similar to consumer identification will become a reality. RFID will also have a major impact on companies, large and small, as well as the accountants working for them. The technology will affect inventory management, contingent liabilities, depreciation, supply-chain management, and even customer interaction.

WHAT IS RFID?

Like bar coding, RFID is a technology that enables scanning for tracking purposes, but that’s where the similarities end. Bar codes use the Universal Product Code (UPC) system that identifies the manufacturer code and the product code of the item. RFID goes much further. Scanning an item equipped with RFID can return a variety of data including the manufacturer, item information, which supplier shipped it, the specific cost associated with the item, the path it took to get to the store, and almost any other kind of relevant data you could want.

And there are other fundamental differences between

bar codes and RFID (see Table 1 for more information). Bar codes require a “line of sight,” and the scanner usually must be within a foot of the actual product. If an inventory manager has a case of various items, he or she must unload the case, scan each item, and then repackage the case. This interaction can result in increased labor costs and the possibility of damage to items.

A typical RFID system consists of transceivers, tags, and a computer system to process the information. There are two types of tags: active and passive. Active tags have an internal battery that permits tags to be read from a greater distance. These tags also constantly transmit data. Passive tags don’t have a battery and only transmit data when a transceiver activates them by coming within range. Although active tags are larger and more expensive, they have many more potential applications.

Transceivers read and transmit data from the tags to the computer system. An individual with a hand transceiver can simply move the unit within range of the items to be counted, and the transceiver will capture all the information the tags contain. This process requires no product handling and may be completed in seconds. The lack of human interaction with the products avoids damage to the inventory, and very few miscounts are likely to occur.

CORPORATE EFFECTS

The impact that RFID will have on businesses will reach into a number of areas from counting to costs and revenues to warranties.

Inventory Costing and Inventory Management

There are two types of inventory systems: the perpetual system and the periodic system. The perpetual system allows managers to know with a great deal of precision what items are in stock at any given time. In contrast, the periodic system usually entails a full count of inventory once per period. The costs associated with doing a full count more than once per period can be significant. An organization that uses a periodic system must typically keep a close eye on shelf levels to determine when items need to be reordered and/or shelves restocked. RFID can support a perpetual inventory system.

Another potential benefit with RFID is related to assigning costs correctly. Both the periodic and perpetual systems use inventory-costing systems like first-in, first-out (FIFO) and last-in, first-out (LIFO) to assign costs to items. These systems assign costs to outgoing products based on previous invoice prices. A FIFO system assigns the cost of the first items received, whereas LIFO would start from the latest invoice. The result is that the real cost of an item is never recorded, and aging and obsolescence are rarely taken into account. Overall, although the perpetual system does a better job of keeping the books updated to the minute, it's just as flawed as the periodic system when it comes to assigning appropriate costs to specific items.

The best way to assign the proper costs to items sold is the Specific Identification Method (SIM). SIM is a way to track inventory when each item can be identified. Specific identification is usually used for large, easily traceable items. This method is often reserved for low-volume, high-priced products because it can be a very costly system for companies that have large inventories and numerous transactions. It requires each individual item to be tracked and to have an assigned cost. But since bar codes only identify the manufacturer's code and product code, it's impossible for a retailer to know, for example, which shipment a particular can of tomatoes came from and the unit price associated with that shipment.

With an RFID system, units can be tracked on an individual basis. Each item can have a tag, and each tag can

transmit manufacturer codes, product codes, exact associated costs, date manufactured, length of time on the shelf, and other useful information. Since exact costs are available at any time over the course of the year, a snapshot of the company's inventory can be taken. Precise inventory levels, cost of goods sold, and a more accurate net income can be obtained at any time.

Boeing Co. has recently started preparing its suppliers for the push to RFID, although no mandate has been put in place at this time. Over time, Boeing expects that RFID will lower receiving costs, improve the ability to track parts, and reduce the risk that unapproved components will find their way into the planes. They expect their suppliers to benefit through lower inventory costs, improved configuration control, and more detailed repair histories.

Labor Costs

Saving money on salaries is another major benefit of RFID. Considerable time can be saved by not having to count individual items. Picture, for example, a stock boy sorting through every item in a store and scanning the bar code or manually writing down counts of items vs. any store employee standing in the middle of the stockroom and collecting all the information with one push of a button.

With an active system where item movement is constantly tracked, a perpetual count of inventory will be updated the instant there's a change. If a retail outlet has transceivers placed strategically throughout the store, inventory management personnel can be notified about stock deficiencies. Fewer personnel will be needed because companies will no longer use staff to track inventory and determine restocking.

It's important to note that while this technology is extremely powerful, no system is infallible. It would be in a company's best interests to employ auditors to make sure that tags and transceivers are working properly. While this will offset some of the labor savings, the benefits will outweigh the costs.

Depreciation

In the fast-paced technology sector, today's newest item or component can be obsolete tomorrow. This rapid movement through the product life cycle presents a challenge for companies and their accountants. Intel, for example, produces millions

Table 1: Comparison between RFID and UPC

	RFID	UPC
Storage Capability	256 characters (Generation 2)	10 Characters
Read Method	No direct line needed	Direct line needed
Read Speed	Up to 1,000 reads per second	Up to 180 reads per second
Data Recording	Can have Read and Write capability	Read only

of chips and other products annually. To keep its manufacturing facilities stocked with necessary supplies, there are components in transit constantly. James Kellso, manager of Intel's Supply Network Research, determined that management of his inventory in transit had major implications on the company because the items depreciate as much as 5% per week. By implementing active RFID tags with global positioning capabilities (GPS), Intel was able to reduce inventory by 82%.

For manufacturing companies with large inventories, RFID provides distinct advantages. ES3 LLC, a supply-chain services firm that co-locates inventories of multiple manufacturers, uses RFID to keep track of its inventory located throughout a 230-acre facility. The technology gives the company instant tracking and data for all 1,900 trailer-slots in its yard. Geoff Davis, executive vice president of ES3, estimates that he saves 33% of his normal labor requirement with this information and avoids the risk of spoiled cargo, late departures, lost trailers, and excessive detention.

Revenue Creation

While there are many cost-saving benefits associated with RFID technology, there are also revenue-creating ones. For example, retailers can be notified immediately and stocking staff automatically prompted for replenishment if shelf quantities dip below desired levels. This benefit can't be overemphasized. The costs associated with raising brand awareness, inciting purchase intentions, and actually getting the customer to the store are very high. It's a huge waste of money when a customer is ready to buy but the sale can't be consummated because the shelf is bare.

Extra Future Store, a supermarket in Rheinbert, Germany, has already taken this capability to the next level. Extra has its entire inventory outfitted with RFID tags and its shelves and shopping carts equipped with transceivers. Store employees are always aware of inventory levels. And the shopping carts are equipped with monitors that inform customers of sales promotions as well as items in an upcoming aisle that they may have an interest in based on the current contents of their cart.

Warranty/Service Benefits

The automobile manufacturing process, for instance, involves many parts and long labor hours. When a defective part is discovered, all cars assembled using that particular part must be identified and fixed before leaving the plant. This process may require stopping the manufacturing line, closing the auto yard, or calling back cars that

have already made it off the premises. All of these fixes are time-consuming, labor-intensive, and can increase the direct labor costs per car and decrease net income.

With RFID, many of these difficulties can be avoided. If all parts have tags, the plant manager can easily identify the location of all the parts that need to be replaced or called back. RFID also can improve asset utilization, reducing warranty and scrap inventory.

By reducing expected warranties, a company can also reduce its contingent liabilities. If a company operates in a business environment where warranty expenses are probable and can be estimated reasonably, then the benefit of RFID's ability to reduce warranty expenditures will have an immediate impact on the income statement since assigning an estimated liability for warranties occurs concurrently with a warranty expense.

Costs and Drawbacks

A major drawback of RFID is that there is no standard system currently in place. Two basic architectures that are jockeying for position are EPC Global, which can connect to the Internet, and ISO/IEC, which is being used by the International Organization for Standardization.

Another drawback is the large investment required to implement an RFID system. Today each tag costs approximately \$0.30. At this price, wholesalers, manufacturers, and large ticket retailers are the only ones who can afford RFID. For the high-volume retailer, \$0.30 can be prohibitive. On the other hand, as more companies embrace the technology, the price of RFID tags is expected to come down to around \$0.05 due to economies of scale. In addition, the costs of training, computer system upgrades, and changes to business processes add to the difficulties of implementing an RFID system.

A third drawback involves supply-chain integration. This difficulty should be diminished as the larger retailers demand that their suppliers implement the RFID system. Leading the push to RFID are Wal-Mart and the U. S. Department of Defense (DOD). Both organizations have mandated that their suppliers comply with their RFID guidelines.

Wal-Mart, already known for its innovative inventory and supply-chain management, continues to take a leading position in the implementation of RFID. Rollin Ford, recently appointed Wal-Mart CIO, has indicated that the company has no plans to slow down its RFID initiatives and that it even planned to stop accepting Gen1 (first generation RFID) shipments from its suppliers.

The DOD contends with multiple layers of bureaucracy and red tape in nearly everything it does. The Depart-

ment would like to counteract some of the delays and cut waste from its supply chain with RFID. According to Alan Estevez, assistant deputy undersecretary of defense for Supply Chain Integration, the Army lost \$1.2 billion in materials that weren't received in the field. Interestingly, many calls for supplies start with handwritten orders from the field. The DOD now requires suppliers to begin implementing RFID systems and expects the new system can shave about 27 days (from 33 days to five days) off the time it takes to get needed supplies to troops.

COMPANY PERFORMANCE AND THE ACCOUNTANT'S ROLE

While initiating a move toward RFID will involve substantial investment, the cost savings and revenue creation will more than cover the costs over time. Savings can be achieved in many ways. In the technology industry, where depreciation rates can be very large, good inventory management is essential to maximizing profits. With an RFID system in place, a supplier can track inventory sent out to its customers. A supplier can also keep a continuous count of the inventory levels of its customers and automatically send replenishments as needed, in effect creating a just-in-time system.

There are many new challenges that the accounting industry will face as a result of RFID. With respect to inventory-costing methods, specific identification hasn't really been feasible for most companies until now. Use of the FIFO and LIFO systems cause inherent inaccuracies in ending inventory calculations as well as cost-of-goods-sold estimates. These inaccuracies present a direct challenge to one of the most fundamental principles of accounting: to portray the company's financial position accurately. While the deviation from this principle has been accepted due to the associated costs of using a specific identification inventory system, RFID will soon make it possible to achieve more accurate costs.

WHAT IS HAPPENING NOW?

RFID is becoming more and more popular. A study released recently by trade organization Computing Technology Industry Association (CompTIA) at RFID World 2006 in Dallas, Texas, suggests that about 59% of responders have tried the technology. About 15% of the companies have actually implemented RFID projects.

RFID also is being used in more and more industries. GlaxoSmithKline (GSK) announced that it will begin putting RFID tags on bottles of Trizivir, an HIV medicine. Working with IBM to develop this RFID system,

GSK chose Trizivir for the pilot program because the FDA has identified it as one of 32 drugs most susceptible to counterfeiting and diversion. RFID has been used to tag poultry in Taiwan to combat the Avian Flu epidemic and in Canada to tag cattle. RFID is being used by NASCAR, libraries, and many other businesses.

It seems there are two significant hurdles that need to be overcome for RFID to be more successful. The first is the shortage of skilled professionals, and the second involves potential privacy concerns. The CompTIA survey reported that about 50% of the companies expect problems in finding educated and trained professionals to implement new RFID projects.

Regarding privacy, many people and organizations are concerned about the capability of RFID to remain active and unnoticed after sale. In fact, the chips are so small that when they're placed within an item of clothing it's possible for the consumer to not even realize they are there. Many are concerned that companies will use this technology to track consumers' shopping or travel habits. While it's possible to disable tags, the paranoia of shoppers could cause a consumer backlash against the technology. Many privacy advocates have called on companies to state their intended use of the technology. Currently, there is no regulation, so many states are trying to fill this void in standards by introducing RFID bills. For example, a New Hampshire bill suggests that a label be included to warn people about the potential fallout over the information. Though the FCC regulates the frequencies that are used in RFID, and some ISOs have been published for the RFID industry, there is still concern regarding the covert scanning of RFIDs and the possible misuse of information.

Whatever the final decisions of the regulators might turn out to be, RFID is finding its place as a valuable tool in business. ■

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