

NerdHerd

# Inventory Management

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When you walk into a store like Wal-Mart or Hy-Vee, you might take it for granted that the store will have everything you need and want. Behind the scenes, however, there's a lot more going on. From the manufacturers' warehouses to the shelves, the business must orchestrate a symphony of the right products to the right places at the right times. This essay first discusses the two main methods of inventory management: Material Requirements Planning and Just-in-Time. Next, we write about the technical means of keeping track of inventories like RFID tags and bar codes. We conclude with discussing how Wal-Mart, one of the world's largest retailers, manages its inventories.

### **Material Requirements Planning**

Material Requirements Planning (MRP) a technique of production planning and inventory control that manages the manufacturing processes. Most of these systems are software based. The MRP's main functions involve processing lists of the materials needed to make a final product and getting the products and their parts to where they need to go. The techniques are geared towards assembly operations but have many other, related applications. MRP was created in the 1960s by Joseph Orlicky who was studying the Toyota Manufacturing Program. By 1989, about one third of the software industry used a second version of MRP. Some reasons to use MRP are it reduces inventory levels, MRP improves shipping performance, and MRP has a reduced purchasing cost. A major problem with the system is the accuracy of the data. Accuracy of the data can be improved by pull systems and bar code scanners. MRP focuses on making sure that all products desired are readily available.

### **Just-in-Time Inventory Management**

Evolving after MRP is Just-in-Time inventory management. The supply chain is a group of businesses' that give each other products. For example, the lawnmower manufacturer gets his

wheels from one business, the metal comes from another business, as do the seats, brakes, and other supplies. “Just-in-Time” inventory management is when the supplier gets the product to the retailer as close to its time of purchase as possible. When the product comes to your work station, and it is your turn to put the piece on, and you run out of the part, then the supplier delivers you the supplies just in time. Another way is when you reach for a part on the shelf you should have the right amount of supplies. There should be no more or less of the part.

“Just in Time” inventory management works best when a supplier happens to be very close to you, but the techniques can be used by suppliers anywhere in the world. The suppliers learned that too, so now it’s cheaper to buy in bulk than in single orders.

A down side of “Just in Time” is that the method doesn’t get products to their final location fast enough. If inventory is disrupted by anything, then consumers must do without.

When things like natural disasters destroy one store in the supply chain, the whole supply chain is disrupted. Earthquakes have caused 25% of the world’s “Just in Time” to shut down because of damage to the factory buildings. Tornadoes have caused more than 130 manufacturing operations to close as of March 22, 2011. Manufacturing sites have had to be patient and deal with the inconvenience. If the suppliers’ building is destroyed, it still costs the manufacturers’ company.

When they have to stop production of a product, they have stock outs, which are when businesses have no products from one of their items or all of their parts. Companies try to buy from all over the world so they won’t have as many stock-outs. Only about 10 percent of companies have plans for when “Just in Time” gets disrupted. Sometimes they still do not receive inventory fast enough to please customers despite plans for when supply is disrupted.

Then, when customers are not satisfied, they go to different manufacturers, leading to a loss of sales.

### **Bar Code**

Today, bar codes play a huge role in inventory management by identifying products quickly and efficiently, but they haven't always worked that well. The first bar codes started as light sensitive ink in the 1940's and 1950's. However, the scanners were very large and difficult for the cashier to use. Inexpensive laser technology in the 1960's made scanners much more accurate and easy to use. The Universal Product Code (UPC) became popular in the late 1960's by the Universal Code Council (UCC). As computers evolved, UPC codes became more accurate and available to companies. At first, only grocery stores used UPC codes, but as other companies realized how efficient they were, many stores adopted the process. Companies have to apply to the Universal Code Council to use UPC codes. Then the UCC will send the company a six-digit manufacturer identification number and instructions on how to use the service. Of course, companies must pay a yearly fee to the UCC for this service.

There are two parts to a UPC code: a bar code and a UPC number. The first six numbers in the UPC number are the manufacturer identification number. The next five are the item number, unique to each item. The last digit is called the check number and is used to make sure the item is scanned correctly through an extensive computerized math process. When an item is scanned, a computer system identifies the item's price in only a second.

### **RFID Tags**

RFID tags are labels encoded with data captured with radio waves. The tags are similar to the common UPC barcode, but the barcode requires optic scanning to read the data. The information on the RFID tag can be changed and updated as necessary, which makes it more

functional and adaptable than the barcode. With this technology, store owners can see who is buying their products, how fast, and when they need to restock. An example is the inventory system of Wal-Mart. RFID tags are read with RFID interrogators. These are radio frequency transmitters and receivers that read the data from the tags and pass them on to computers. RFID tags are also useful because they can be used in harsh weather conditions.

### **Electromagnetic Anti-Theft Devices**

Electromagnetic systems (EM) are dominant primarily in Europe, but are used worldwide by retailers, chain stores, supermarkets, and libraries. When people say “electromagnetic tag”, they are actually referring to a highly permeable metal wire or ribbon. The permeability allows magnetic signals to easily flow through it. This is how they work: A magnetic strip that contains iron with an adhesive layer is attached to a product. The strip is not removed at checkout -- just deactivated by a scanner that uses a highly intense magnetic field, thus being able to be reactivated at a low cost. It becomes saturated when the tag is driven with flux. Also, the system uses different levels of saturation and differences in metal to tell the difference between an activated tag and car keys in someones pocket.

### **Wal-Mart: An Example of Inventory Management**

Wal-Mart Corporation set up its first satellite communication system in 1983, so they can provide the needs of any Wal-Mart store in the country. Using the system, Wal-Mart Corporation was able to see exactly how the day was going: they could see the bank credit sales adding up as they were happening. Using this, they were able to reduce ineffective inventory, because it let Wal-Mart stores manage their own inventory and stocks. This also helped them be able to cut back on their money spent on inventory that customers didn't want, which meant they spent more on what they did. Wal-Mart and Protector and Gamble (P&G), their suppliers, joined

together to keep the P&G inventory in the Wal-Mart stores. They built an automatic reordering system, which linked all the Wal-Mart computers with all the P&G computers. Using this, they were able to send a message to the P&G computers whenever any Wal-Mart store was out of inventory. Using this system, Wal-Mart was able to check its stocks constantly, and identify which items were being sold fast, and which items were not doing so great. P&G was also able to lower their costs, and pass on savings to Wal-Mart because of the coordination. Wal-Mart has also thought of another ingenious way to manage inventory. They have started to use “smart tags” which go on men’s jeans and underwear. They put these smart tags on individual pieces of clothing and underwear. Workers can read the smart tags from a distance, provided they use a little hand-held scanner. Almost immediately, the worker will be able to tell what sizes are missing, and how many are in the inventory room, so they will always have sizes on hand, and be able to keep the shelves stocked. The smart tags use weak radio signals to identify the products. Wal-Mart has come up with many cunning ways to manage their inventory, and they definitely influence the way inventory is managed in every store.

All of the above technologies help businesses get all of the products where they need to go. There’s a lot that goes into managing inventories for companies, especially those as enormous as Wal-Mart. By helping consumers get all of the products they want and need, businesses that utilize the above inventory management technologies and similar techniques help us all lead happier, healthier lives.

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