UNIT-17 Tracking Inventory

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Discuss the objectives of inventory tracking
- ✓ Understand the purpose and advantages of barcoding
- ✓ Explain the benefits of Radio Frequency Identification (RFID) for retail businesses

Unit 17

Tracking Inventory

Bar coding Technology and Applications

Introduction

Efficiently run businesses require many operations to flow seamlessly and without hindrance. **Automatic Identification or "barcodes"**, as the industry is more often referred to, makes these steps more efficient and accurate. A barcode does not change how a business operates, but it makes **procedures faster and more accurate,** providing useful management information in a timely manner. Barcodes can be employed in virtually all organisations and all professions to increase the productivity, efficiency and accuracy of specific business processes.

What is a Barcode?

Figure 17.1

A **barcode** is simply a set of **symbols used to represent alpha-numeric information**. Basically, instead of seeing the number "1", or the letter "A", you would see a series of bars, both fat and thin, used to represent that number.

So, why replace the alpha-numeric characters with a barcode in the first place, you might ask. Humans can easily determine that a strange combinations of lines and curves and dots

are put together to form a letter or number, but computers aren't as quick in deciphering such information. Even though Optical Character Recognition has come a long way in recent years, it's much quicker and much more accurate for a mechanical device to decode and a series of black and white lines than it is to read human text.

A number of barcode standards have been developed and refined over the years into accepted languages called **symbologies**. We would use different symbologies for different application in the same way that we would use a bold or italic font to emphasise a particular line of text in a report. Different symbologies or **"barcode fonts"** are used for different applications. By having standardised symbologies, we ensure that when you print a barcode, I will be able to scan and decode it with my equipment and you will be able to scan and decode my barcodes—as long as we both use the same code and are within the specifications dictated by the barcode standards.

Figure 17.2

Barcode symbologies come in two basic varieties. They can be either **linear or two dimensional** in their configuration. A **linear barcode** symbology consists of a single row of dark lines and white spaces of varying but specified width and height, as indicated by the example below.

Figure 17.3

Similarly, a **two dimensional symbology** (2-D) can be configured into a stacked or matrix format. Two dimensional barcodes are special rectangular codes which ‗stack' information in a manner allowing for more information storage in a smaller amount of space.

Figure 17.4

The amount of data that can be encoded in a **linear barcode symbology is more limited** than that of a 2-D barcode symbology. A one inch 2-D matrix symbology, for example, can encode thousands of characters of data, whereas a comparable linear barcode would have to be several feet long to hold the same amount of information.

Benefits of Bar coding

Many people think of **bar coding** strictly as a technology. A broader way of looking at bar coding is viewing it as a **tool for managing information**. Barcodes enable quick, accurate data entry. Having **accurate data available** enables managers to make decisions based on valid information. For example, with a manual system you often must make an educated guess on inventory levels and when to reorder products. On the other hand, the accuracy of **barcode scanning** provides **up to- the-minute information about inventory levels**, including the **value of inventory investment**. This information can help you maintain lower inventory levels and improve cash flow, which is invaluable to your business.

The most compelling **advantages of bar coding** and **automatic data collection** are:

- **Accuracy:** Bar coding increases accuracy by reducing the likelihood of human errors from manual entry.
- **Ease of use:** Barcodes are easy to use as long as the appropriate hardware and software components are in place to maximise the process of automatic data collection.
- **Timely feedback:** Bar coding promotes timely feedback of data captured in real time, enabling decisions to be made from current information.
- **Improved productivity:** Barcodes improve productivity in that many manual activities and tasks become automated, enabling resources to be utilised in other ways to increase efficiencies.
- **Barcode technology can be translated into three primary functions:** tracking, inventory management, and validation. Whether you use one function or a combination of functions, the benefits in cost savings, improved productivity, and quality can be substantial.

Components of Bar coding

Barcode systems come in many different sizes and shapes. The complexity of system required is determined by the application. A **basic scanning system** is fundamentally broken down into the following four components:

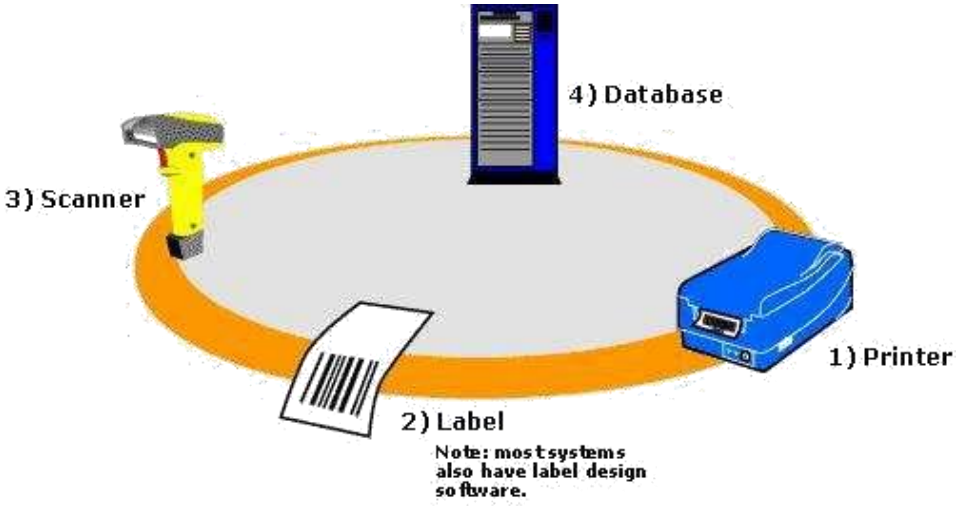

Figure 17.5

Component 1 – The Bar Code Printer

The **barcode printer** provides the first component part in a barcode system. A variety of technologies and methods exist to print a barcode label. You can use laser printers and pre-set templates (often included in label design software such as Wasp Labeller or Zebra Bar One software) to print your barcode labels. They are usually printed onto Avery stock. More commonly, labels are printed using barcode label printers such as those made by Intermec, Datamax, or Zebra. These printers print labels much faster and are of higher quality than those printed using a conventional laser printer.

Component 2 –The Bar Code Label

As mentioned above, you need the barcode printer to print the barcode labels. In addition, you need some **software application that can design your labels**. These are the same labels that you will then attach to a box or an asset for tracking. An item label can contain any combination of text, graphic or barcode information. Many label packages such as Wasp Labeller or Zebra Bar One, have pre-made templates that can easily start you on your way to designing your label. In addition, they have compliance label templates for specific industry labels such as the automobile industry.

Component 3 – Scanning Equipment for Data Collection

The data collection phase occurs through the use of scanners that instantly and accurately read, capture and decipher the information contained in the barcode label. Scanners read information much faster and more reliably than humans can write or type. Therefore, significantly reducing the rate or likelihood of error.

There are **two different types of scanners**:

- contact and
- non-contact.

Contact scanners required **physical contact** to scan as opposed to **non-contact scanners** which can be **several inches to several feet away**. Of these two types of scanners, there is also one other major attribute; they are either **decoded or non-decoded.**

Decoded scanners have built in hardware decoders that interpret the meaning of a barcode **before sending the data to the computer**.

Undecoded scanners simply have light sources that capture the encrypted data and **sends them to a decoder of some sort.**

Decoders are either **in-line hardware units or software decoders** that run on your computer. As you may have guessed, decoded units are usually more expensive than their undecoded counterparts. They do have the distinct advantage of only having one component to worry about if something breaks down instead of trouble shooting many components to find out why your barcodes aren't reading properly.

Component 4 – Capturing the Data to an External Database

The final component to establishing a simple barcode system is **the database**. Just because you've created and scanned barcodes successfully doesn't mean you've completed the loop to creating a complete and effective barcode system. To be able to effectively use the codes you've created and scanned, you need a database of some type to **relay and update information.** Many barcodes can be tied to item numbers for example. These item numbers can then, in turn, be linked to information about the item, such as product description, price, inventory quantity, accounting, etc. For example, let's say you have widget A, with a corresponding barcode that has the value of 1234. When you sell widget A, you scan the barcode. This, in turn, causes a chain reaction that tells your database that you: have one less widget A in stock, that you should charge $.20 for widget A, that this information should be passed onto accounting, that the product needs to be shipped only through UPS ground, etc. All of these actions were caused by scanning the barcode representing Widget.

There are many other configurations, but this is the fundamental building block for bar coding.

Tracking

Anything that can be identified with numbers (or numbers and letters) can be tracked using barcode technology. However, applications continue to expand to nearly every area to help track cost per procedure. In addition to assuring greater accuracy, **barcodes** help speed the process of recording where and what an item is, or what service is provided. **Barcodes** can be used to track a product throughout the supply chain and workflow. **Bar coded numbers** also can be used to track a particular item back to the manufacturer. For example, if there is a defective item, bar coding can help track the item back through materials management and purchasing to the distributor and/or original manufacturer. Although it is possible to do the same thing manually, the amount of time involved would make the process too cumbersome.

Common Barcode Applications

In retail applications, labels adhered or attached to a product or item of clothing contain **barcodes** which are read by a scanner during checkout and interpreted by a computer. The computer recognises the barcode‘s data bit reference and is able to link the item to its sales

price and description contained in the store‘s mainframe database. This product information is reflected, not only, on your sales receipt, but is **automatically linked to the store‟s inventory tracking system** which knows to deduct the quantity of the item purchased from the stores‘ current level of inventory. This entire process occurs in a matter of seconds with only minimal data entry required by the checkout person in the form of quantity purchased – e.g. one or more.

Similarly, in a package delivery scenario, e.g. common carriers such as UPS® or FedEx®, the **barcode label** enables the package to be tracked as it passes through diverse sorting hubs en route to its ultimate destination. Throughout the package‘s journey, each sorting hub scans the package to register its receipt before passing it onward. Therefore, if the package‘s arrival is ever delayed or misplaced, it can usually be tracked by its **barcode tracking number** to the exact point in the process where it may have stalled.

In addition to the retail and packaging industry, **barcode data collection** is used in a variety of industries, including but not limited to manufacturing, healthcare and automotive. Generally any industry or company can utilise bar coding to track and improve their current processes and operations.

Radio Frequency Identification (RFID) Technology and Applications

Figure 17.6

Introduction

Radio Frequency Identification (RFID) is a fast and reliable means of **automatically identifying and logging just about anything, including retail items, vehicles, documents, people, components and works of art**. Because it makes use of **radio waves**, there is no need for —line of sight reading of information, which is one of the limitations associated with barcode systems. It means **RFID tags** can be embedded in **packaging or, in some cases, in the goods themselves.**

Information from an **RFID system** – the —data capture element of an IT system – is passed to management information systems that are used, for instance, to control stock levels and provide details of who is currently in possession of what asset. Apart from its automatic identification and data capture capabilities, **RFID (Radio Frequency Identification)** can also provide the **electronic article surveillance (EAS) function** – a case of single technology taking the place of two.

A tiny chip connected to an antenna – typically a few centimetres square in total – sends information when requested to a reader. By means of anti-collision techniques, many tags can be read practically simultaneously, representing an enormous timesaving over barcode reading, which requires operators to find the right position for the reading of each barcode individually.

An RFID (Radio Frequency Identification) tag can work just like a barcode – in other words, it can hold a unique article number which works like a —licence plate , calling the information relating to that number from a separate database. But because it can contain a relatively large amount of digital data, the RFID tag can hold source information itself, as opposed to a mere —look-up number, therefore making it infinitely more useful for supply chain and many other applications.

In addition, RFID "readers" in a read-write system are also —writers , that means information can be written to tags at any point in, for instance, a supply chain, a security and access procedure or a maintenance operation, using a hand-held or fixed reader. With a barcode system, the only way of changing information is to print a new barcode or alter information in the system's database.

The principle of RFID

A RFID (Radio Frequency Identification) architecture that leverages the auto ID centre's current set of production ready standards consists of the following building blocks:

- A passive RFID tag, which, when exposed to the electromagnetic waves of the RFID reader, broadcasts its electronic product code (EPC) information.
- An RFID Reader, which activates the tag and reads its response.
- The Air Interface, which can be specified using the Auto ID centre standard or ISO18006.
- The savant server, which has a real-time in memory database (REID), an event management services (EMS) and a task-management system (TMS) used to filter the stream of information from the reader to the next higher level.
- The Application server communicates with the savant server via a Simple Object Access Protocol (SOAP) interface that leverages secure socket layer (SSL) encryption to transport information over the Internet. The application server middle ware bridges the gap between the savant-based protocols (SOAP) and the (proprietary) protocols used by the business systems. RFID information can also be routed directly to the supply-chain execution systems, such as a TMS, WMS, and point of sale or Supply chain Event Management Environment. However, this puts additional load onto these systems and exposes them directly to the savant deployment strategy in the enterprise.

The RFID (Radio Frequency Identification) tag responds to the reader by broadcasting its electronic product code (EPC), which is a 96-bit code consisting of:

- 8 bits of header information.
- 28 bits identifying the organisation that assigned the cod
- 24 bits identifying the type of product.
- 36 bits representing serialisation information for the product

RFID Challenges

Is the RFID (Radio Frequency Identification) better than Barcode?

As RFID technology reaches greater deployment levels, the cost of tags and readers will drop even further and RFID will become price competitive with conventional barcodes.

However, RFID brings several key advantages to the table that will make it a relevant competitor to barcodes, even while the cost of a tag is higher than the cost of a printed barcode label:

- Barcodes can be read only in the line of sight; labels must be positioned to be directly visible to the barcode reader. **RFID tags only need to be within the RFID reader‟s radio reach (about ten feet).**
- Barcodes cannot be read inside other containers, **RFID tags can be read through most materials**. Therefore, the concept of a shipping container can be verified easily without the costly overhead of an —Open Box Inspection and manual counts and comparisons with shipments manifests.
- Barcodes provide only limited amounts of information –even two-dimensional barcodes are limited in the amount of data they can carry. The Auto ID centre‘s definition of a product information server (consisting of a distributed repository Infrastructure and naming services) allows us to tie **unlimited amounts of dynamic information to each tag.**
- Barcodes identify classes of products - **RFID tags identify individual products**. The Auto ID centre concept aims at identifying and tracking individual product instances as they move through the supply chain, Therefore achieving greater granularity and better accuracy.
- The migration of supply chains from barcodes to RFID will require significant investments and will not happen overnight, RFID and barcodes will coexist – in fact, they will coexist with human readable labels-for the foreseeable future.

Benefits of RFID

Labour Productivity

Worker productivity levels will increase in the receiving area of the warehouse. Instead of manually scanning each inbound shipment and verifying it with the purchase order, the increased automation from the **RFID (Radio Frequency Identification)** technology permits employees to eliminate manual operations in the receiving function which will allow products to move to storage or the outbound dock faster. Other tasks that receiving can complete more efficiently with RFID are:

Facilitating the return process of damaged or unsaleable goods;

- Improving quality control (on order integrity);
- Increasing put away rate; and,
- Minimising errors in placement of shipments (cross dock or storage).

Forklift drivers will also have an easier time putting away items in assigned and unassigned slot locations. There would be no need to scan an additional barcode on a pallet at the slot location. Furthermore, **RFID (Radio Frequency Identification)** technology would eliminate the need for physical inventory counts and reduce cycle counting. Moreover, employee's work location can be tracked through RFID technology revealing the amount of activity recorded. These studies will increase work productivity by providing employees with incentives to work more efficiently and effectively.

Inventory Reduction

By installing **RFID (Radio Frequency Identification)** technology into a warehouse, organisations reduce many of the challenges associated with inventories. RFID tags provide more visibility to the products so their **location is more easily determined in the warehouse**. This increased visibility reduces the likelihood of a stock-out occurring because of misplaced inventory or inaccurate inventory levels. Cycle service levels will also improve due to lower safety stock levels and the overall faster throughput of product at a warehouse. According to an inventory management report, RFID technology will reduce total system inventory by approximately 5%.

Facility/Equipment productivity

RFID (Radio Frequency Identification) technology allows more data to be processed faster through a warehouse management system (WMS). The WMS uses the acquired information to improve the operations of the warehouse. If vehicles are scanned as they enter the inbound gates of the warehouse, dock utilisation improves because the WMS can more effectively assign vehicles to unloading doors based on order priority. If the product is not needed right away, the WMS would assign the vehicle a position in the yard. RFID technology also removes the need to manually place bar coded items on conveyors in a specific orientation so that barcode readers can read them.

Other Benefits

There are several other benefits to the warehouse using **RFID (Radio Frequency Identification)** technology. **Shrinkage**, which is product stolen by employees along with misplaced items, will be reduced because the warehouse will have a better understanding of where the products are located and it will be more difficult to move products out of the warehouse without being detected. **Forecast accuracy will also increase** due to higher levels of visibility of product throughout the supply chain. This improvement will positively affect the overall efficiency and effectiveness of the warehouse in areas such as:

- Order cycle times;
- Safety stock levels;
- Fulfilment accuracy; and,
- Cycle service levels.

One of the most serious examples **of misinformation about RFID (Radio Frequency Identification)** in recent years has been the claim that it is generally more expensive than barcode systems. It's true that an individual tag is more expensive than an individual barcode. It's also true that RFID – currently, at least – is inappropriate for the tagging of low-cost items. However, the comparison needs to go much deeper than that. That is particularly so in supply chain applications where containers holding the goods and the dollies on which they stand have a distinct inventory value of their own.

Tags are reusable and have very long lives, so in a supply chain operation where containers (often millions of them) are continually reused, there would be no need to re label the containers, saving on manpower and other costs associated with label production and fixing.

Multiple tags (up to 100 or more) can be **read practically simultaneously**. Using latest breakthrough technology, the Multi Scanner take readings on the move as the dollies supporting containers are pushed through the Multi Scanner portal or gateway. The productivity gains over barcode reading are enormous.

An **RFID (Radio Frequency Identification) system** can track and trace the containers, dollies and other reusable equipment used in the transportation of the goods, as well as the goods themselves. This is highly significant for distribution / logistics companies with container inventories of several million pounds, who need to ensure that their assets are returned regularly. If 10 per cent of assets are lost in a year due to poor or non-existent trace ability by a distributor with £10 million worth of reusable containers, an RFID system could pay for itself in months on this basis alone.

RFID has been proven to be more efficient than barcode systems in terms of read failure rates, even though the speed of read is many times faster. RFID is also less prone to human errors.

In summary, RFID provides:

- Substantial productivity gains
- Elimination of re-labelling costs and effort.
- Greater accuracy
- Flexibility of data on the tag – e.g., goods and containers can be identified and tracked using the same tag
- Ability to write additional or replacement information to a tag at any stage in the supply chain.

RFID"s biggest advantage is being a non line-of-sight communication technology. Eliminating the need for line-of-sight communication allows products, cases and pallets to be automatically scanned in larger volumes and at higher speeds, allowing for greater improvements in efficiency.

RFID solutions consist of four basic components:

- Tags;
- Readers;
- Antenna; and
- Software.

Each will be discussed briefly below.

Tags - RFID tag is a device that is placed onto, or in some cases into, the pallet or stock-keeping units (SKUs). Basically, a tag is an electrical device that uses radio frequency antenna to communicate with the **RFID (Radio Frequency Identification)** reader. Information is stored in the tags that describe the object

Tags can be differentiated as being active or passive. These can be seen in the pictures below. The active tags are self-powered whereas the passive tags use the signal from the RFID reader as the source of power. While the distinction between tags might seem minimal, the impact on their capability is significant in both read range and data storage. Active tags use a battery-powered transponder that emits a constant signal containing identification information. Active tags have the greatest range of all RFID tags, including search and read/write capability. Today, they have up to 128 Kbytes of storage space, but could hold more in the future. Passive tags have no battery, but instead rely on an antenna as the power source, drawing power from the reader's electromagnetic signal. Passive tags have a much more limited range (less than 2-3 yards), have limited storage space (as of now, 128 bytes, but could hold more in the future), and lack data manipulation capabilities.

Figure 17.7

Readers - RFID (Radio Frequency Identification) tag readers are simply devices that scan the RFID tags. RFID tags have an antenna that transmits and receives information. The reader decodes and reads the information. The RFID reader converts the radio waves from the RFID tag into a form that can be passed along to an information system. The cost of the readers corresponds directly to the level of functionality needed. Readers that must scan multiple items, moving quickly on a high-speed conveyor or through a dock door are significantly more expensive than the basic hand held readers.

Fixed Reader

Figure 17.8

Mobile Reader

Figure 17.9

Antenna - RFID tag readers use an antenna to communicate to the RFID tag through the tag's antenna. Some readers have integral antenna while other can have various types and sizes of antenna fitted to them. The antenna is a critical component in the RFID system, as it has to be built for the coverage area. The antennas vary depending upon the facility location, size, area, and volume. Usually, an antenna operates in the 3-15 MHz range.

Software - Software and middleware are the most important pieces of an RFID solution. These packages are needed to make use of the information read by the reader to integrate the RFID technology with all the other systems operating in the warehouse:

- warehouse management systems (WMS),
- transportation management systems (TMS),
- event management systems (EMS),
- order management systems (OMS), and
- enterprise resource planning (ERP) systems.

The ability to capture, store, rationalise, and integrate information captured by RFID

Technology, including product information, location, volume, and transactional data, allows organisations to more efficiently pick/pack, ship, route, track and distribute materials.

This operational improvement can result in lower inventory levels and improved labour and equipment productivity. Integrating the information from RFID tags into an EMS or ERP system allows alerts and alarms to be sent when a certain set of conditions has occurred, e.g., inventory is running low or products have been idle too long.

The information from RFID will also be useful when integrated with reporting software. Companies will be able to quickly target problem areas in their warehouse and identify areas of improved efficiency. However, due to the lack of systems standards, there can be compatibility issues that arise in the software implementation process.

RFID IN Retailing Sector

Operating at razor thin margins in a highly competitive and largely undifferentiated market, top retailers are always on the lookout for opportunities that have a positive impact on the bottom line. Retailers have engaged in several initiatives to operate at higher levels of efficiency. Extensive use of information technology for process automation, supply chain collaboration techniques like CPFR, VMI and efficient data exchange mechanisms like EDI and XML have all enabled leading retailer‘s Walmart to run a tight-ship and gain competitive advantage.

RFID is an automatic identification and data capture (AIDC) technology which allows for non-contact reading to track and monitor physical objects. There is a tremendous interest in the application of RFID to the manufacturing /retail supply chain, which has gained momentum primarily on the strength of the technological advances that are bringing down the costs of tags and readers and the efforts of the EPC Global Inc. In establishing industry standards, a key benefit of RFID technologies is automatic identification of individual objects coupled with automatic data capture. Automatic electronic identity contributes significantly to enhance supply chain visibility, and the automation brings in data capture and has a direct bearing on operational efficiency in labour intensive Retail Logistics.

Supply Chain Visibility

Physical tracking of merchandise today is a challenge with significant implications across the supply chain for retailers. Visibility into the merchandise pipeline within the enterprise is extremely critical to ensure that an optimal level of inventory is maintained – not too much to lock in excess working capital, and not too little to cause stock-outs. Also, lack of visibility results in insufficient coordination between material flow and information flow often causing a magnification of demand variability in each level up in the supply chain – a phenomenon popularly known as the bullwhip effect. Companies rely on a variety of means for real-time data and process integration to alleviate this problem.

Operational Efficiency

A key element of cost in a retail enterprise is the area of Logistics Management – encompassing all activities that enable the movement of merchandise from vendor/manufacturer premises to the intended point of sale. About 25-30% of the supply chain costs can be attributed to labour costs in the process of distributing merchandise.

Retailers extensively use software tools for warehouse management, yard management and transportation management. Industrial automation systems like conveyors, carousels, and unit sorters enable enhanced operational efficiency within the distribution centre. Businessprocess innovations like multi-order picking, pick-to-light, use of voice and wireless technologies have all contributed significantly to higher productivity in warehouse operations.

Potential Benefits of RFID to Retail Enterprises

Falling prices of tags and readers and the rapid strides in the standards development process is making **RFID (Radio Frequency Identification)** technology an increasingly viable option for pallet and case level tagging. However, retailers stand to gain most when individual items are tagged, with significant opportunities in enterprise inventory management and retail store operations. While the current tag costs rule out the economic viability of item/unit level tagging in most cases, there still could be a good business case in certain specific merchandise categories and applications. Pallet and Case level tagging also has the potential to enhance operational efficiency for the retailer. The likely return on investment from RFID tagging varies largely, and is an inverse function of the current level of process optimisation. Typically, processes that employ lower levels of process automation tend to demonstrate higher returns. For example, the receiving and check in process in warehouses as well as stores is a labour intensive and time consuming process. For a warehouse that currently employs minimal automation in the receiving process, one can expect major benefits by one-step receiving achieved using RFID tagging. On the other hand, the benefits would be much less if one-step receiving is already deployed using state of the art material handling equipment and data capture means.

What follows below is a quick look at the potential benefits from RFID in various functions in the retail value chain, and an assessment of the added value over and above a process that employs the state-of the-art automation.

RFID in Warehousing

Receiving

RFID tags might have the most potential to improve the warehouse‘s receiving processes. Under current bar coding practices, a worker must scan each product or case before it‘s moved into the warehouse.

RFID technology allows significant improvements in the throughput speed of product at the receiving dock. The RFID scanner reads the shipment within seconds as it passes through the portal readers. Additionally, the RFID technology eliminates the need to physically check the bill of lading and/or the packing slip.

Furthermore, **RFID (Radio Frequency Identification)** will connect with the WMS system to indicate if a product needs a cross-dock movement. Cross docking is one of the most efficient processes for moving inventory through a warehouse without storage. Cross docking is initiated at the receiving dock. When a product is received and scanned, the WMS interfaces with the OMS to determine if this product is needed to fill an open order. If so, the product is moved literally —across the dock to the outbound dock (or picking/packing) so the order can be completed and placed on the waiting vehicle. If the item is not needed to satisfy an open order, it is placed into storage. RFID will make this —open-order —identification faster

and more reliable than traditional barcode scanners because it will occur when the product is pulled from the delivery rather than after it has been placed on the receiving dock floor.

The benefits from not scanning each shipment, automated bills of lading, and improved cross dock movements reduce labour costs and allow the receiving docks to handle a greater amount of product. For instance, if an incoming load is needed to refill an out-of-stock item or is scheduled to depart on a cross-dock movement, the RFID system designates the load as high priority and communicates this information to the worker. In addition, the RFID system will help manage the flow of damaged goods into the warehouse. The damaged goods that are set aside can be read by the RFID technology as received as damaged. This process will significantly reduce labour hours spent on managing the damaged goods process.

An RFID system also offers greater efficiencies in warehouse systems that rely on conveyors. RFID eliminates the need to ensure that cases/items are placed properly on the conveyor so that the barcode can be read accurately with the barcode reader. Normally, this means that the barcode is —face-up or on top of the box since many barcode readers scan from above the conveyor. RFID allows for accurate reads regardless of product position, resulting in fewer reading errors. Elimination of product positioning requirements on the conveyors will also improve the speed of overall product flow through the warehouse. This will also reduce labour costs since additional workers will not be needed on the conveyor to reposition products so the barcode is facing the proper direction.

Storage

RFID (Radio Frequency Identification) technology also provides benefits in put-away accuracy and efficiency. Forklift drivers could still rely on the current WMS system to identify the locations for pallets and products. However, an RFID system can eliminate the need to scan the barcode on the pallet and at the slot location in the racks. For example, if the pallet and slot location read by the RFID scanner do not match the WMS specification, the system notifies the driver that the product has been placed in the wrong location. Moreover, the need for additional barcodes on each pallet is eliminated. This pallet identifier barcode is also called a —license plate. Since a single scanner can identify all of the RFID tags on individual products, the placement of a license plate on the pallet level would not be necessary.

Additionally, RFID has the potential to improve temporary storage at the warehouse. Since the RFID tags can be read from anywhere, products and pallets do not have to be placed in specific or assigned locations. This is called a random location system. It is also operable with barcodes. This random system allows for a much more flexible storage environment and can help to minimise honeycombing (honeycombing is a situation that arises in a racked warehouse where large empty rack slots exist among filled slots). RFID-related applications can also be used to identify product compatibility problems. If non-compatible or hazardous products are stored near each other the RFID system could alert the employees for an immediate removal of one of the products.

Pick / Pack

RFID (Radio Frequency Identification) readers can integrate with the WMS and OMS systems to ensure that the correct items and amounts are picked. Another benefit of RFID is to help measure productivity in the warehouse. Through a type of RFID-enabled time-motion measurement, management could analyse the process to set benchmarks, evaluate employees and plan labour requirements. This is also enabled by barcode systems. The difference is that with RFID systems, manual scans of products are eliminated.

Shipping

An RFID reader can confirm that each item is placed onto the correct outbound vehicle, which can improve the accuracy of the shipping process. This verification can be made as the product moves through the portal of the outbound dock door. These processes allow for an automatic double check of the items loaded into the trailer against the bill of lading (a bill of lading must accompany each shipment tendered to a carrier; it is, among other things, a description of the shipment) or manifest (a manifest identifies the products and their locations in the outbound vehicle). It should also be noted that the use of RFID could greatly reduce the amount of employee theft in a warehouse.

Placing RFID readers at exits of the facility and employee areas ensures that all items leaving the building are accounted for, regardless of the removal method.

Companies can expect savings in labour and other efficiency benefits from RFID.

Further Reading:

- ✓ ***Automation Of Inventory Management Process by Katende Kenneth Kidonge***