

RFID Applications in Inventory Control

Imagine a store in which you just walk in and pick up the required items from shelves and just walk out. No waiting in long queues for billing or no wastage of time and effort. Tracking of items, pricing, total billing would be done automatically and total bill amount would be deducted from customer's credit card account. This could be a reality with RFID enabled stores.

RFID systems collect accurate and real-time data and communicate it via radio waves. A typical RFID system has three components, tags, reader and RF unit. The RF reader sends out RF waves that are received by the RF tag within the reader's range. The tag in turn, sends information back to the reader, also in the form of RF waves. Then the RF reader transfers this information to RF unit.

RFID technology finds its applications in various commercial sectors for example, at various stages of a supply chain, inventory management in a warehouse, access control for buildings, tracking passenger baggage in the airline industry, animal tracking. RFID holds great potential for inventory management for today's supply chains. Inventory management is an important aspect of supply chain management.

Inventory Control and RFID Technology

Effective inventory management depends upon consolidating, integrating, and analyzing data collected from many sources such as, distribution centers and warehouses. Conventional tracking systems require manual intervention, which is labor intensive, time consuming, and error-prone. On the other hand, the use of RFID technology has significant advantages over the conventional methods; these are discussed below:

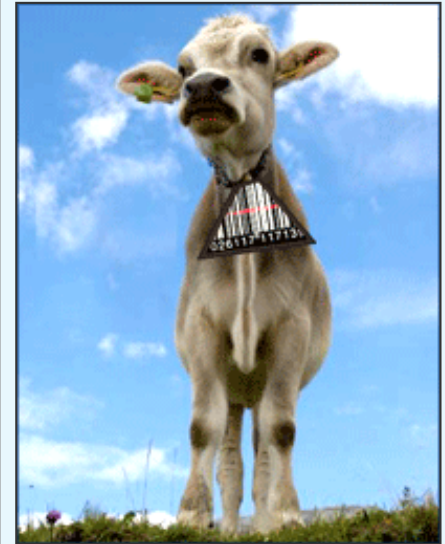
Inventory monitoring and asset visibility – Smart Shelves

In a replenishment-based system, whenever the total inventory at a warehouse or distribution center drops below a certain level, the RFID enabled system could place an automatic order. RFID-tagged products will allow stores to track the location and count of inventories in real time. This will better monitor demand for certain products and place orders to prevent an out-of-stock situation. The high levels of inventory monitoring obtained using RFID can particularly benefit **FMCG industries**.

PoS Data:

On the retailing side, RFID technology at the point-of-sale (PoS) can be used to monitor demand trends or to build a probabilistic pattern of demand. This application could be useful for **apparel industry** or products exhibiting high levels of dynamism in trends.

Reduced Bullwhip effect:



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Exaggeration of demand in upward direction in a supply chain network is termed as Bullwhip effect. Due to tracking limitations of conventional systems it may not be possible to get accurate information on actual sales of items; that will amplify the magnitude of the bullwhip effect. If RFID systems are used for information collection, accurate and real time information on product sale can be captured and used for decision making. This will definitely help to reduce overall bullwhip effect. Reducing bullwhip effect would benefit industries where instances of **supply-demand imbalances** have high costs attached to it.

Lead-time Reduction:

Conventional systems limit tracking of items while being transported. RFID Systems gives a total visibility of product movement in the supply chain. This may help to make early decisions about inventory control in case there is any interruption in the supply. It partially or completely eliminates time and effort required for counting while loading/unloading the items. This results into reduction of total lead-time for arrival of an order. **Pharmaceutical industry**, perishable product industry could use RFID systems for reducing lead-times that will help to increase total useful shelf life of items.

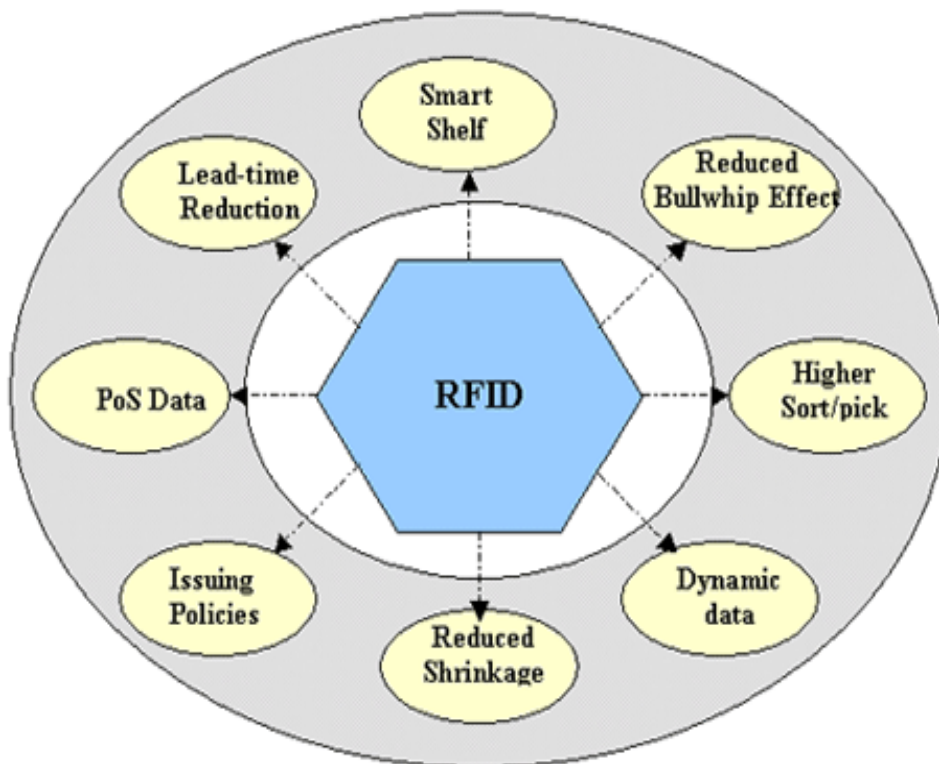
and reduce costs.

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RFID for Inventory control

Improves sort/pick rate :

In a warehouse, sorting/picking activity is more time consuming and subjected to errors. For example, for issuing of items from a store, a person has to find out whether the item is available in store or not by physically moving to the location. Items issued should be kept in a particular position (bar-code upward) in a pallet for scanning/billing purposes. RFID systems ease the sorting and picking operations, as it captures real-time, accurate information about product availability in host computer database without physical movement. RFID tags are read via radio frequencies therefore it is not mandatory to place the items in a particular position to read it. This could be helpful for effective **warehouse management**.

Reduced inventory shrinkage :

As items are continuously monitored, Inventory shrinkages including thefts, misplacement of items can be avoided using RFID technology.

Perishable inventory control

A perishable product has limited useful life and if it is not handled properly while transporting, it may get spoiled and its useful life reduces. If this reduced life information of items is not updated, then it may be possible that an outdated item gets delivered to a customer. In such a case, there may be an additional cost of replacement of item and also loss of goodwill of customer. Such spoilage could be reduced simultaneously with automating inventory management, by using RFID technology for product identification, while it moves through the supply chain. RFID system can track the items in real time without product movement, scanning or human involvement. Using active RFID tags it can be possible to update information on it dynamically.

Issuing policies

(FIFO/LIFO): RFID systems give exact count and location of items. This will help to follow a certain issuing policies for items as per the requirements. E.g.: First-in-first-out (FIFO) policy for items such as, vegetables, bread; or last-in-first-out (LIFO) for **blood banks**.

Using RFID technology for data collection and some appropriate inventory algorithms for replenishment decisions, many warehousing processes can be automated such as, receiving, picking, and ordering. Various enterprise applications, for example ERP packages, can be configured and linked to RFID technology for direct and on-line collection of data. It could be possible to combine RFID and Bar coding technology for tracking of items to take competitive advantages of both the technologies.

RFID implementation will depend on the cost of change to the new technology as well as the benefits accruing from exploiting some of the possibilities that the technology brings. Several issues should be considered for successful RFID implementation. Level of tagging has a greater influence on total RFID related costs. Tags can be applied at item level, case level or pallet level. Denser the level of tagging more would be information gathered and higher would be the associated costs. However, for all type of applications it is not the scenario where denser the level of tagging higher would be the benefits attained. It is important to select appropriate level of tagging for a particular type of application. Tags can be applied at pallet level for less valued items, for example, auto spares parts, FMCG items. Case level tagging would be appropriate for perishable items in which expiry date for all items in a case is same. Pallet and case level tagging would be useful for warehouse management. The tags could be applied to individual items for tracking of high valued items, for example, gold ornaments, baggage tracking.

Current market situation for RFID business is in developing phase. Most of the companies are implementing RFID on a trial basis to a small sector of their business, *i.e.* warehouse, or distribution center. Some of the market leaders those who have already implemented RFID technology are; in retail sector, DHL, McDonald's, Texas Instruments, Tesco; in automotive sector BMW, DaimlerChrysler AG, Goodyear; in manufacturing industry Boeing, Hyundai, Toyota; in airline industry McCarran International Airport, US, Virgin Atlantic Airways.

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