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A Brief Study on Automated Inventory Management & Utilizes: Creative Inventory Management

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A B S T R A C T

In this concurrent era inventory management is crucial task in every manufacturing firms. Moreover, manufacturing industries are facing top competition in finding the appropriate level of inventory that should be maintain by organizations towards meeting at customer needs as well as efficient and smooth production process. The main aim of this paper is to empirically examine the impact of various technology for automated inventory management practices in the manufacturing industry. Due to various internal and external factors, inventory cost gets volatile, which create scarcity of required inventory due to unexpected demand and supply. Looking at global competition in recent days, the manufacturing inventories are adopting various strategies related to different inventory management practice like AIDC, RFID, AI, Electronic record, Barcode scanners etc. Study concludes that effective management of inventory process management will able to provide competitive advantages for manufacturing industry to survive in long run.

Keywords:Inventory, AI, AIDC, challenges, Inventory management

1. Introduction

In the ever-evolving world of inventory management, there is constant focus on improving efficiency. Business of all sizes regularly assess their current capabilities and look for ways to maximize the efficiency of their existing infrastructure, while preparing to adapt new technologies that can increase their performance to a new level. For operations managers conducting through research and due to diligence with appropriate ROI analysis to fully understand the impact any change can have on all of their operations is as important as ever.

Automatic identification and data capturing (AIDC) is an emerging technology that has received wide attention and has the potential to revolutionize the inventory management industry. There are many AIDC technologies, such as barcodes, optical character readers, biometrics radio frequency identification, and voice recognition. This paper will explore the current state of using RFID tags, including the pros and cons, with some insight into their usefulness and leading solutions for asset tracking and inventory management, and how these technologies can bring results to our work.

2. Problem Statement

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It is essential that an inventory management system allows managers to receive real-time inventory information. Traditional inventory technology provides an inventory solution for products available on the shelf, when some products are lost, expired damaged, etc. But traditional technology is incomplete, because you are not updating the inventory. Supply chain activities imply the need to track merchandise from docks and warehouses to trucks and retail centers. Incorporating RFID technologies like RFID to process your inventory. Supply chain activities imply the need to track merchandise from docks and warehouses to trucks and retail centers. Incorporating RFID technology into logistics and supply chain operations is expected to reduce labor costs and improve the overall efficiency of inventory management. This type of RFID enables managers to monitor inventory levels in real time. When the product passes through the supply chain, the RFID reader can automatically monitor and record this information. As a result, inventory movement speeds up, stock outs and accounting errors are reduced. RFID will help managers make informed decisions accurately anytime and anywhere, and save time and labor costs. Therefore, through correct inventory management, trading companies can accurately analyze which products are the best-selling products and which products are slow to sell. Therefore, this study recommends the use of RFID tools in inventory management. The collaboration of RFID and existing inventory technology can bridge the digital divide between corporate inventory managers and inventory processes, and improve inventory management.

3. Research Methodology

The research followed a qualitative approach. Conducted a comprehensive study of the literature on inventory management functions. Used conference papers, technological papers and online resources to identify various jobs covered in RFID to improve inventory management.

4. Literature Review

Astha (2017) Passive tags collect energy from a close by RFID reader's interrogating radio waves. The long run security mechanism for the development of RFID is additionally mentioned during this paper. In existing analysis work, there had been a great deal of challenges relating to security of RFID. During this analysis they secured RFID. In some analysis the protection key to cipher information wasn't abundant sturdy and delays was increased in information transmission because of security reasons.

Y. zare (2014) The purpose of this article is to consider part of the RFID of the foremost vital applications within industry, provides a research study and comprehensive trends of research, of this work carried out from 1985 to 2012. Article classified within the year of publication and terribly straightforward in every case. This study raised by 550 items on RFID. During this study, the author created requests for databases of RFID literature technology in 1985 and 2007 and statistics.

Shiauweichan the paper shows that the inventory management problems faced by the manufacturing organizations, overproduction, out of stock, delayed delivery of raw materials, and inconsistent records. Factors, store documents/records, plans, employees/employee skills knowledge have shown in significant impact on effectiveness of inventory management, while funds have shown a slight impact on inventory management of small and medium-sized manufacturing companies.

Anjali Mishra (2018) The main purpose of this article is to study the inventory management technology used by in Linamar India Pvt.Ltd. and to find some measures to improve the inventory management process of the related company. From this data research, it can be concluded that Linamar India Private Limited manages its inventory very effectively.

Punamkhobrasgsde (2018) The inventory management system is the software used by to help businesses operate hardware stores, and store owners maintain sales and purchase records. The inventory management system will have the ability to track sales and on-hand inventory, indicating to store owners when they need to reorder and purchase the quantity. The inventory management system is a windows application developed for the windows operating system focuses on the field of inventory control and generates various required reports.

5. Research Background

AIDC (Automatic Identification and Data Capturing)

Automatic Identification and data capturing (AIDC) is a large class of technologies used to collect information from individuals, objects, images, or sounds without the need to manually enter data. The AIDC system is used to manage inventory, delivery, assets, security and documentation. The sectors that use the AIDC system include distribution, manufacturing, transportation, medicine, government, and retail. AIDC applications generally fall into one of the following categories: source identification and verification, tracking, and interfacing with other systems. The actual technology involved, the information obtained and the purpose of the collection vary greatly.

AIDC Technology includes:

Barcode, Two-dimensional barcode, magnetic strip, smart card, optical character recognition (OCR), Radio frequency identification & some bio metric applications.

RFID (Radio Frequency Identification

RFID technology is expecting unprecedented growth. With improving standards, reducing costs, improving reliability, and increasing the adoption rate, various business departments are looking to RFID technology to improve the efficiency, accuracy, productivity, and connectivity of their business processes. The manufacturing industry has been using RFID technology for some time. Most manufacturers are aware of the benefits that RFID brings to the supply chain, but they often overlook the benefits that RFID technology can provide in the actual manufacturing process. Automotive manufacturers, pharmaceutical manufacturers, textile and apparel manufacturers, machinery and spare parts manufacturers can all benefit from integrating RFID into their manufacturing and other processes. Let's take a look at some of the ways RFID is changing the manufacturing industry.

Pros of using RFID tags for inventory management: Improved visibility, reduce labor costs, recyclable asset tracking.

Cons of using RFID tags for inventory management: The phone cannot be used as scanner, the high cost of scaling, demanding infrastructure requirements, security issue.

- **Importance of RFID in manufacturing industry**

Automotive manufacturers, pharmaceutical manufacturers, textile and apparel manufacturers, machinery and spare parts manufacturers can all benefits from integrating RFID into their manufacturing and other business processes.

Let's take a look at some of the ways RFID changing the manufacturing industry.

In some cases, compared to traditional inventory tracking methods and manual inventory checks, the use of RFID inventory system has been shown to increase inventory accuracy by up to 13% especially in the retail industry, maintaining inventory accuracy is an ongoing challenge and implementing a more automated system has some benefits. In a warehouse environment, the implementation costs can outweigh the benefits in some cases. In situation

where very high inventory accuracy is required, this can be beneficial, but the trade-off between hardware and labor costs should always be considered.

- **Use of RFID in different industrial sector**

RFID in production

In the actual production workshop, RFID can provide great help. Many times, production involves processes under harsh environmental conditions, such as extreme temperature, humidity, abrasion, and the presence of chemicals or other fluids; RFID systems that can withstand extreme environmental conditions can be used to control and monitor operations, thereby improving the efficiency of the manufacturing process. RFID tags can store a lot of information; this information can be used to optimize the production process. In assembly line production such as automobile manufacturing, RFID helps to make the manufacturing process more flexible. In addition, RFID technology can be used to monitor equipment in facilities by making machines, conveyor belts, trucks, or forklifts. In addition, the raw materials required for production can be marked with RFID this will enable you to monitor the movement of raw materials in real time, enabling efficient production planning.

RFID in supply chain application

Uses RFID technology in the supply chain to help improve the accuracy, efficiency and reliability of manufacturing, distribution and transportation. RFID can view the required materials and assets in real time to keep the manufacturing process running at the efficiency of the clock. RFID can reduce transportation errors, improve safety, verify raw materials and finished products and equipment helps regulate factory inventory, allowing users to better predict their needs through real-time data on raw material, equipment, or supply demand. RFID actually reduces human intervention, thus eliminating errors in inventory management. In addition, inventory of the location of equipment and tools integrated with RFID technology can help improve production planning or eliminate the need to recorder materials that are considered missing. RFID also helps limit the reduction or loss of resources.

- ***RFID Technology in Real World***

Microcomputer assembly company uses RFID technology to control and chart the inventory of products, reducing the cost of replacement components and shortening the delivery time are the main benefits of the company

General Motors (GM) has ratio frequency identification tag installed directly on cylinder heads and engine blocks to keep track of all the manufacturing processes that the engine block or cylinder had goes through, in order to immediately know any error in the manufacturing process.

Kabel prima pulp and paper integrates an RFID based identification solution into its manufacturing process, and enabling workers in Kabel factories to monitor and track the current production steps that are being processed for a batch or managed paper Continuous form. Some semiconductor manufacturing companies are using RFID in their clean rooms to gain control, improve the quality and efficiency of operators, and increase equipment utilization. RFID technology enables manufacturing plants to operate easily while increasing output and keeping costs is low. With continuous development of RFID technology, new solutions will emerge in the manufacturing industry.

- **Functions of RFID in Manufacturing**

Inventory traceability-RFID tags for components, WIP, and finished products provide real-time visibility into manufacturing operations and provide a continuous stream of data for manufacturing operators to improve captured decisions.

RFID Equipment Tracking and Supervision-Placing RFID tag on this equipment helps locate lost or mis-placed assists required for production setup and execution.

Production Scheduling-Manufacturers also use RFID to identify idle equipment. This helps them increase asset utilization by arranging production more efficiently.

Waste and shrinkage monitoring: Marking components inventory, WIP, and finished product helps manufacturers monitor the level of waste on the production line and potential sources of internal theft or loss.

Reduce transportation costs -The implementation of RFID can improve data accuracy and enable manufacturers to implement JIT inventory management strategies. This helps reduce inventory holding costs because items are replenished as needed, rather than large amounts of inventory.

Transportation Route-RFID tags can carry data related to the scheduled transportation route. After production is completed, this data can be used to help organize outbound shipments. This data accessibility speeds-up the transportation process and reduced the labor required.

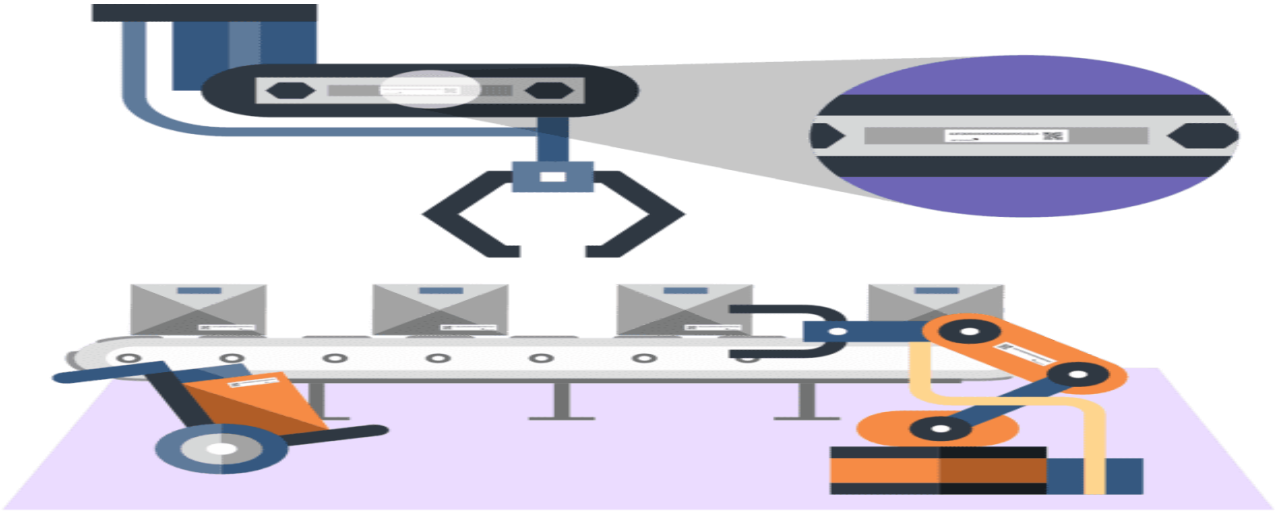
Workforce Security and Tracking-Radio Frequency Identification can also be used to track and manage employee productivity as they moved through the facilities.

Mechanical integration-In some cases, manufacturers use RFID to help control and monitor large mechanical activities. In this case, RFID is integrated with the mechanical control system.

- **Asset Tracking in Manufacturing**

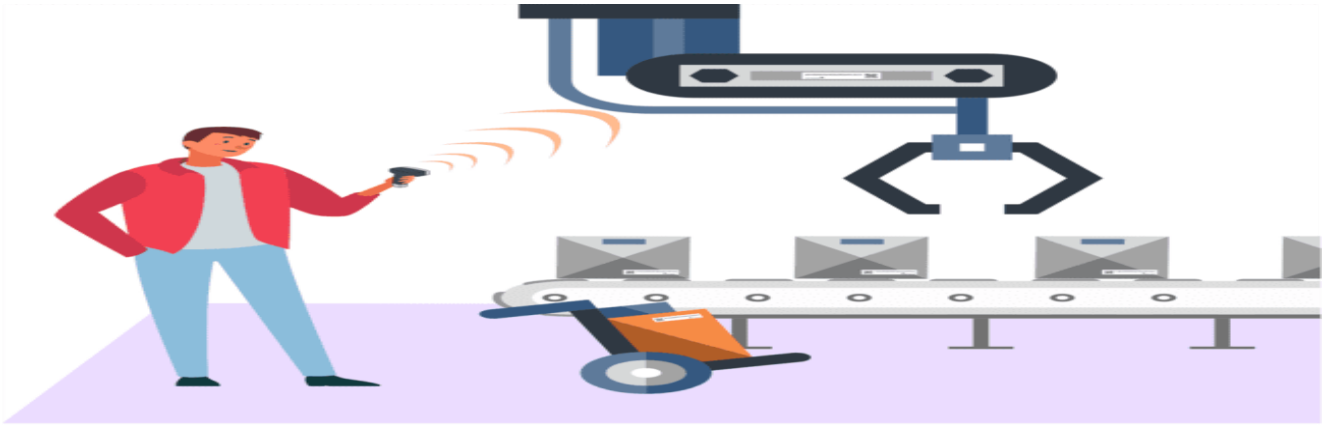
A variety of assets such as molds, tools, and stationary machinery can be used in the manufacturing process. It is important not only to know the location of these assets, but also to have simple methods to maintain them. RFID is used to improve asset location visibility and provide a means to take preventive maintenance and repairs.

1. Item Tag



The RFID tag is attached to the asset. For metal asset, special metal RFID tags can be used. These metal labels are designed to improve performance when applied to metal.

2. The RFID Reader



Uses RFID to automatically collect data throughout the asset's operations. For example, for tools used, use RFID to quickly record user entry and exits. Similarly, utilize the capabilities of RFID readers and handheld devices to collect assets movement and presence in critical areas**.**

3. RFID Maintenance

When maintenance and repair is required RFID tags are used to identify assets. In some cases, the data can be written directly to the RFID tag. In other cases, RFID tags can be used as unique identifiers for assets so that they can be quickly and accurately identified in the data based.

- **How RFID transform inventory management process?**

Insight Inventory and Summary Use automated RFID technology by hand to replace old manual inventory call methods with automated hands-free RFID technology. The accurate inventory data allows the correct rapid knowledge based to make the best decision for your business.

Obtain the right ideas in your warehouse, you can avoid an excessive inventory you need to spend many resources for storage and handling. In this way, it is avoided that you have deadly and season dead items. At the same time, the personnel is an automated message that has been easily encountered on the staff.

6. Suggestion

A ZEBRA technological partner company has designed gate with RFID sensors that detect any package or goods with RFID tags. The sensor automatically scans tags which are detected and entries for the same are shown in the software developed by them.

Previously each package / good were scanned separately by hand which was time-consuming. This issue has been resolved by the company but the loophole remains those which personnel was carrying the goods at the time and because of this, it boils down to the same which is manual scanning each package / good separately for correct and precise information to be registered.

To resolve the above-mentioned problems, we have come up with the solution. We can embed an RFID tag within the employee's uniform which relays the employee's general identification number to the software which in turn will register the goods / packages to the employees who passed with them at the time.

At the same time company has to provide Anti-RFID covers to their employees to prevent their credit / debit cards to be scanned as packages / goods it self as the modern Debit / Credit card come with an in-built RFID chip.

The same can be used as an attendance system for employee's as major and most attendance systems are fingerprint based and as we are currently in this pandemic situation this may lead to serious chain infection in case an infected employee's residuals come in contact with non-infected employees. Even though the ID cards come with a barcode it is a hassle to use the same. We have to align the barcode clearly with the scanners as it misses the scan most of time. The above-mentioned solution can be used to check attendance as to which employee used the main gate at what time and how many times at the given date.

7. Conclusion

Technology can help business owners better manage their inventory. Using RFID technology in inventory management will help them monitor inventory effectiveness, shelf inventory, misplaced inventory, etc. RFID can play an important role in allowing business owners to understand what is happening in the inventory without having to be there to help them in person. Make informed decisions and understand the urgent matters that may require your immediate attention. RFID tools bridge the distinction between objects and humans. Therefore, this study encourages inventory managers to actively promote RFID technology development programs to improve their company's inventory management. Nowadays, RFID technology is applied to many fields and is superior to traditional technologies such as bar codes in many aspects. In the transition phase, we must bridge the gap between new technology and existing technology. By doing so, the replacement of the existing technology can be successfully completed. As companies begin to fully understand the benefits and efficiency of RFID, and as standards consolidate, it seems that the technology will become more and more common in many industries. By integrating RFID with existing systems, companies will have more ability to access location and product data in real time and take advantage of the value created in their supply chain.

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