RFID Technology in Manufacturing and Supply Chain: Improving Productivity and Reducing Costs

Goutham Kacheru

Master's in information systems technologies, Wilmington University, New Castle, Delaware, USA.

Abstract: RFID is derived as radio frequency identification. Highly stated technology is used in RFID by manufacturers to increase the rate of return on RFID. RFID has an application centered on the unreliability of tag standards. Many different applications in the Industry elaborated, such as force task management, tracking the item, identifying the parts in a closed loop, and customers aren't required to synchronize RFID technology, different parts of sellers and providers. This gives end users a much bigger range of chances for RFID adoption, which provides users with the option of many confirmed products that are saved by grown-up international standards (Poirier, C. C., (2006). The components used in the RFID tags are bar codes, minicomputers, wireless LANs, industrial controls to manage materials, and handling systems. An RFID solution strategy from a business process standpoint identifies points in the process where data are classified, collected, communicated, and acted upon (Poirier, C. C., (2006)). Enterprises have to look further than the tag to see the value of RFID. This research paper describes how companies are using or using internal RFID systems to address different concerns such as maintenance, diminished costs and security, changes, and enhanced proficiency.

Keywords: Company, implementation, maintenance

1. Introduction

The method of any RFID system is to transmit data in appropriate transponders, which are generally known as tags, to retrieve data from machine sources, suitable time and place to fulfill specific application requirements. Tag data provides a unique identification for every item during production, whereas the goods in shipment are a location to the identity of a vehicle, an animal, or an individual. The additional data the overlook is provided for assistant applications over the item. Specific information or instructions are immediately available for reading the tag (Finkenzeller, K. (2003)). A system requires additional tags, reading and interrogating the tags, and communicating the data to a host computer or data management system for manufacturing. To recognize and grow in value the experiences of RFID systems, it is essential to consider their essential parts. It is also necessary to consider the data flow requirements that influence the

choice of systems and the facts of communicating across the air interface. The system components and their purpose within the data flow chain make it possible to understand most of the important issues that influence the operative application of RFID.

2. Problem in Industry

RFID has been implemented in different ways by different manufacturers and services; RFID devices are by no means meant to leave their network in the case of RFID tags, such as inventory control (Günther, O., Kletti, (2008)). This causes problems for many manufacturing companies. Many consumers also have problems with RFID standards; if a company wants to use the speed pass, they have to pay to access in another case, a company has to own its "SpeedPass," a consumer to carry many devices with them that would be problematic for the consumer.

3. Description of the Business Problem

RFID systems can easily disrupt that most of the RFID use electromagnetic spectrum, such as wifi and cell phones. They can easily jam using energy for the right frequency, creating problems for consumers like time delays at checkouts. RFID collision takes place when the signals from more readers collide with each other, which creates a problem in tracking the details. The system must be set up to override these problems (Poirier, C. C., (2006). The anti-collision protocol technique is used to enable the tag to be transmitted to a reader. RFID also has many Security and privacy issues, such as:

- The RFID tag is difficult to remove: consumers face the problem of removing tags. Some are small and thin sheet paper. Another may be embedded inside the product that the consumer cannot see.
- RFID scanners are portable: They can be read only from a small distance. This causes content to unauthorized persons, and some tags can be disabled when the product leaves the supply chain (Günther, O., Kletti, (2008)).
- RFID tags are easily read without having knowledge: consumers can easily read the tag embedded in clothes and other products as it can be scanned before entering the store. RFID tags have unique serial numbers. The present technology is used to overcome this problem. A universal product code is introduced with barcodes so that each product sold has a unique number that is linked to the credit card number of consumers. So, having a unique identification code can solve misplacement of the product.

4. Overview

This theory is concerned with the assembly of products by barcodes and radio frequency identification (RFID) in supply chain management (SCM). SCM has been an improvement on A key focus of many organizations is mostly concentrated in cost savings. Barcodes are coded by horizontal strips of vertical bars used to identify the product. The product is manually manipulated prior to being scanned.The items scanned to process the possibility of human error.The barcode is used to identify a product type.The major benefits and disadvantages of RFID technology in SCM.

5. Business Justification

RFID tags can help in connecting trading and supply chains. The benefits RFID can provide are manufacturers' operation and own business processes by not advancing into just supply chain customer's requirements. For manufacturers that always experience traceability and mostly reduce labor cost of materials to save money, RFID technology is used as an excellent technique (Poirier, C. C., (2006). The main reason for business justification is that manufacturing can gain a large return investment in the case of industrial applications with highly proven technology. Industrial applications include the identification of parts. The RFID tag is also used for one component that has bar codes and material handling systems.

6. Benefits and Disadvantages

RFID technology to increase business productivity and cost less. The benefit from RFID provides technology are:

- Cost Avoidance is one of the main advantages of using RFID technology.
- Non-line-of-sight scanning, which saves time.
- Simultaneous automatic reading
- Less usage of Labor
- Enhanced visibility and forecasting
- Asset tracking
- We can track each item in different level of tracking.
- Improved asset utilization
- Traceable warranties
- Reliable and accurate
- Information rich, we can get data instant as a process going on.
- Enhance security
- Robust and durable
- Improved inventory management

The disadvantages of RFID is:

- The cost of tags is high.
- Cost of new infrastructure
- Lack of training
- Limited knowledge
- Immature technology can't make a decision.
- Creates lots of deployment issues
- Lack of Interference limitations
- Ratifying levels
- Concern of return on investment
- Requirement of close cooperation
- Consumer privacy concerns

7. Planning

Planning plays a crucial role in RFID manufacturing inaccurate data about the product in the supply chain. Most retailers give information from the point of scale data to the assembly without a clear knowledge of inventory level. These points are not exactly what is needed in most demand planning. To increase the demands of manufacturers and retailers' efficiency, maximize, cost less, and customer satisfaction to end users.

7.1 Security Concerns

The main concerns in RFID technology are:

RFID security: Security plays a critical role in this is a serious issue that must be addressed efficiently.

RFID for data security: RFID technology ensures that data to be shared in a safe and secure manner to assuage valid concerns about data security.

Future new security: RFID is used for deployment to reach the consumer, new security, and a new generation protocol.

Security at a cost: New security procedures must balance success with cost.

Data security feature: In future generations of protocols will enable RFID to provide more security to a new level.

7.2 Impact of Implementation

Radio frequency identification presents the key original solution to manually detain and track the part of material things all the way through an intact supply chain. The explore influences of RFID technology implementation on cost and profit efficiencies. For this purpose a mathematical model of the supply chain cost structure and functions was created to analyze the impacts (Günther, O., Kletti, (2008)). The model, which has also been verified through a case study approach, is aimed to examine the economic impact of RFID implementation at an automotive original equipment manufacturer and its suppliers. To analyze the impact of the traceability system using RFID technology, a cost reduction parameter will be used. Since in automotive supply chains the functional dependence of individual parts is changing in the upstream and downstream supply chain, only certain parts will be calculated with their complete functions and relations.

8. Administrative procedures

A company was using RFID in manufacturing to track its markers. The corporation made survey markers out of industrial steel with a copper finish cap. These markers were buried underground with a barcode reader at the end, and personnel had to dig down to the end of the survey marker to scan the barcode. The bar code was subject to deterioration due to

environmental exposure over time, so the company was interested in using RFID. They hoped to protect the tags from exposure by placing them inside the survey marker, and to be able to read the survey marker without having to dig it up.

The company worked with Omni-ID to test performance of their tags in the survey marker. Since the tags perform well on metal, the industrial steel pipe did not cause a problem. Yet, inside the pipe with the copper end cap, the tag could not be read. The company suggested putting an aperture in the end cap, and sent samples to Omni-ID for testing. Even with the aperture, the signal was still not strong enough. The Omni-ID engineer suggested using plastic end caps instead of metal. Testing showed that the tags performed well inside the pipe with a plastic end cap. This series of experiments resulted in a successful solution to the survey marker company's problem. The company is now in the process of application testing.

9. Changes in organization policies or enhancements:

RFID adoption criteria in the warehouse, company can have a complete knowledge of the technology implementation possibilities and limitations. Correct decision-making could change the business process, and it is crucial. Most of the companies are not able to understand the technical side of RFID technology adoption. An erroneous or limited knowledge of the technology characteristics and its impacts on the warehouse processes produces an inconsistent definition and a poor evaluation of organizational decisions. Some of these criteria may be considered by companies when deciding to adopt RFID technology in a warehouse: size of company, IT competencies, procedures and policies.

Complexity, return on investment, software integration, reliability and performance of The program itself, and customer requirements. To improve the RFID technology adoption rate, there are adoption barriers that represent major obstacles that must be identified, understood, and as far as possible, overcome, in order for companies in JB to consider adopting RFID technology in the warehouse. Some of the barriers that may be addressed: technological, costs of return on investment, privacy and security, implementation, organization, and environment.

10. Training requirements

The RFID has developed four training modules about this technology as a way of sharing the acquired knowledge and the best practices developed internally: RFID Case Studies & ROI for RFID, RFID Implementation, and RFID Middleware.

RFID Implementation: It targeted engineers and technical professionals involved in processes related to the development, implementation, and operation of RFID. During four days it provides the ideal grounds for professionals that require technical knowledge in this specific area, enabling them to implement and use the technology in day-by-day operations. Through theory and hands-on lessons, the training enables experience of theoretical concepts and focuses on the technical aspects, the physical effects, and the criteria required to successfully apply RFID to tools that may be used in their processes and in the reality of their companies.

Training: Development for professionals requiring training in RFID together with an international certification. By means of a wide set of commenting tests, this course presents topics, providing participants the opportunity to be properly prepared to obtain an international

certification. By the end of the course, the students will be prepared to face the challenge of a professional certification exam. Assembling companies, mechanics, and service experts know that no particular material is right for all jobs. However, RFID needs to be understood and the RFID tag is one main section of the total system which combines bar codes, computers, LANs, wireless, handling systems for the industrial controls to succeed materials more effectively. An RFID resolution design from a business process viewpoint,classifying the data by identifying the process, communicating, and proceeding upon.

Maintenance of the system: Industrial RFID is not only used to optimize discrete manufacturing lines, but it can also play a vital role in keeping process equipment like valves and actuators operating reliably (Finkenzeller, K (2003)). Just like RFID chip cards can be used to control personnel access to buildings, sections of a plant, or individual machines, tagging a critical component with an RFID tag and then using a mobile handheld reader is another application typically found in process plants.

Automating record-keeping has many advantages, including simplifying access to equipment-specific information, streamlining records, keeping preventive maintenance errors to a minimum, and eliminating record falsification. Using suitable RFID tags and a powerful handheld RFID reader enables an effective preventive maintenance program that is not only safer but also more efficient.

8. Conclusion

Rfid tags are the components that are also mechanisms of the enterprise information systems (EIS). To reduce this RFID can give value to your company, its effect on legacy hardware, software and series must be taken into consideration. There are a number of chances to increase financial gain by appropriately using RFID applications that accompany and affect legacy processes. This kind of method will provide state today while placing you to receive future financial gain from your supply chain or other covering applications.

References (APA)

1. Aziz, N. H. A. (2009). *Refrigerator temperature monitoring using RFID*. https://core.ac.uk/download/544125173.pdf
2. Finkenzeller, K. (2003). *RFID handbook: Fundamentals and applications in contactless smart cards and identification*. Chichester, England: Wiley.
3. Günther, O., Kletti, W., & Kubach, U. (2008). *RFID in Manufacturing*. (RFID in manufacturing.) Berlin, Heidelberg: Springer-Verlag

4. Manufacturing. (2011). Retrieved November 30, 2014, from http://www.mojix.com/solutions/rfid-systems-manufacturing.php.

5. Laheurte, J.-M. (2014). *UHF RFID technologies for identification and traceability*.

6. Poirier, C. C., & McCollum, D. (2006). *RFID strategic implementation and ROI: A practical roadmap to success*. Fort Lauderdale, Fla: J. Ross Pub.

7. Retrieved November 30, 2014, from http://www.motorolasolutions.com/US-EN/Business Solutions/RFID Manufacturing Solutions_US-EN.

8. RFID in the Manufacturing Sector: It's all about Profitability. (2012). Retrieved November 30, 2014, from http://www.industryweek.com/companies-amp-executives/rfid-manufacturing-sector-its-all-about-profitability.

9. RFID Technology for Manufacturing. (2013). Retrieved November 30, 2014, from http://www.bciincorporated.com/solutions/manufacturing/rfid.

10. RFIDTags.com. (2000). Retrieved November 30, 2014, from http://www.rfidtags.com/manufacturer-directory.