



Future Revolution of IT Industry-Radio Frequency Identification Technology

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Keywords: RFID, ROI, RTLS, AIDC.

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Future Revolution of IT Industry–Radio Frequency Identification Technology

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Abstract- This document will give an overview of how RFID technology can play a vital role in various industries. Besides RFID which is being used to improve the efficiency of supply chain management, retail industry and many other areas so it's time to adopt and explore implementing RFID in various industries. In addition to this, RFID is also used to enhance the efficiency, productivity, tracking of the products and various tools, security and cost. This paper also covers various industry problems and advantages/disadvantages of using RFID technology. Many other organizations in service sector start to accomplish RFID technology to be functional and useful in tracking the customer's data, safety, and stock control. Being RFID technologies with low cost and privacy issues which are contend to growth and effectiveness of RFID in industrial environment. Moreover, this study also explains that there are several ways to install RFID devices safely in order to progress the Return on Investment (ROI) management processes of the industries. Therefore, RFID technology systems can help in analyzing the costs, benefits through readers and tags devices in order to trace and locate the implanted products with the real-time locate systems (RTLS) implementations, Automatic Identification and Data Capture (AIDC) which can read customer's details to provide more efficient as well as estimate the reduction in inventory associated to operational cost.

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I. INTRODUCTION

Radio Frequency Identification (RFID) technology is a system that identifies objects without the constraint of line-of-sight and helps in real-time data collection unlike bar code technology. In general, the basic RFID technology consists of tags, readers, and end servers to read and identify the unique EPC code from tag (Wu, Ip, Kwok, & Chan, 2011, p. 1).

This RFID technology enhances the efficiency, productivity, tracing the information of the product as well as automatic derivation of the data with the help of technology called *Automatic Identification and Data Capture (AIDC)*.

a) Purpose

Over the past few decades, RFID technology has widely adopted and standardized with innovative applications such as personal services as well as part of our daily life. After manufacturing and retail industry, *IT Asset Tracking industry* is considered as the next generation in market to implement RFID. Most of the

industries are investing more money in the *information technology (IT)* in order to minimize the operating costs, undetected lost, improve safety and efficiency, and it is expected that RFID and its applications can make the changes in the implementation of the infrastructure to become more productive and effective towards services without any errors. The purpose of RFID technology helps to detect the objects through tags and readers.

II. OVERVIEW OF RFID

In modern phrases, Radio Frequency Identification (RFID) technology describes, "A system identification without the constraint of line-of-sight provides a perfect way for real-time data collection and object identification" (Wu, Ip, Kwok, & Chan, 2011, p. 1). In general, the basic RFID technology consists of tags, readers, and end servers to process the data from tag. The functions of the RFID technology are to detect the object through the electromagnetic fields that attached to the tag and with the help of these tags, it is possible to trace the asset data and track the products. To implement the RFID solution, an integrated RFID system should contain five components such as tag, reader, antenna, application software, and communication infrastructure. A microchip placed internally to tag where it can store the information and reader can read the data through electromagnetic waves. "According to the requirements and specifications of the area or organization, the reader and tag are adjusted based on different power output and frequency used" (Cheng & Chai, 2012). There are three types of RFID tags- active tag, semi-active tag, and passive tag. The active tags are more expensive when compare to passive tags because it consists of internal power source, strong signals, and perform two-way flow of data.

An integrated communication between the reader and tag uses methods to control the ID signals such as low frequency (LF), high frequency (HF), microwave frequency, and ultra-high frequency (UHF). "Compared with traditional scan-based data collection technologies such as barcodes, RFID operates at higher data communication speeds, has a larger data storage capacity, and performs the automatic retrieval of data without physical line of sight" (Ting, Kwok, Tsang, & Lee, 2011). Therefore, large quantities of data would generate and in order to control this data issue, a kind of software is used acts as buffer between RFID and the information technology.

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The entire RFID system consists of the actual technology from the tag as well as readers together having access to global standardized databases, to make sure the real time up-to-date data on the items. These tags involve with a unique identification number known as *Electronic Product Code (EPC) technology* that enables the automatic information acquisition and distribute effective data. The communication process between reader and tag can managed through several protocols. Two standardized protocols can operated such as ISO and EPC according to the requirement of the filed. When reader switched on, “these protocols (ISO 15693 and ISO 18000-3 for HF or the ISO 18000-6, and EPC for UHF) begin the identification process and operated on selected frequency bands (e.g. 860 - 915 MHz for UHF or 13.56MHz for HF)” (Ahsan, Shah, & Kingston, 2010, p. 2).

a) Advantages of using RFID

RFID technology will be an advantage and useful in tracking asset data, and reducing supply overstock. According to Wen, Chao-Hsien et al., (2010), explains the benefits of RFID technology according to services such as, “increased safety or reduce errors, real-time data access, time saving, inventory control (cost saving) as well as product supply, resource utilization, and customer satisfaction” (as cited as Abijith & Fosso Wamba, 2012, p. 2).

b) Disadvantages of RFID

Customer’s confidential information and privacy may not be maintained. Interference, high cost, some material create signal problem, and overloaded reading (Ahsan et al., 2010, p. 4).

c) RFID Standards

Having ISO and GS1 EPC standards in place are very critical.

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“GS1 standards are available for UHF tags only (known as Gen 2) in the form of EPC (Electronic Product Code) numbers and the EPC global network” (Lawrence & Jenkins, 2009, p. 6). Through the GS1 technique, various other applications can also track the documents, instruments by using RFID tag which inlayed within the livestock.

Here are some of the specific standards applied in various industries:

d) ISO/TR 20514:2005 Standard

This standard describes, “a pragmatic classification of electronic records , provides simple definitions for the main categories of EHR and provides supporting descriptions of the characteristics of electronic records and record systems” (“ISO,” n.d.).

e) ISO/TS 27527:2010 Standard

Data Informatics provided a framework to improve the identification of the organization individuals and the data elements required to maintain the perspective system processing. This standard outlines, “The details of both data and processes for collection and application of identifying information for providers to maintain the records on providers” (“ISO,” n.d.).

f) ISO/IEC 18000 Standard

This standard is used to “achieve communication across the air interface for specific frequencies between the IC in the RFID tag and reader” (“HIBCC,” n.d.).

Some of the protocols those are included in this standard are-

- Transmission-Reader Talks First (RTF)
- Tag Unique Identifier (UID)
- Memory size
- Command structure and extensibility

g) ISO/IEC 15434:2006 Standard

This standard explains in such a manner that, “data is transferred to high-capacity *automatic data capture (ADC)* media from a supplier’s information system and the manner in which data is transferred to the recipient’s information system” (“ISO,” n.d.). The benefits of using *ADC technology* is to receive the data in a standard form and deliver the information in a standard form. This standard specifies in the data encoded that involves in shipping, receiving, and inventory of the transport units and consists of supporting documentation in the electronic form (“ISO,” n.d.).

III. IMPLEMENTATION OF RFID IN IT ASSET MANAGEMENT SYSTEM

RFID technology plays a significant role in supply chain management and retail marketing industry. In recent years mainly, “the use of RFID in *asset tracking and management* is already a popular application in many organization” (Ting et al., 2011). An important consideration for the development of undetected loss, *RTLS*, stock control. The study shows that, with an increase in demand and a number of challenges in the market, the RFID technology is implemented in various sectors. Depends on the situations, the best technology should be evaluated and used. In most cases, the *RFID* and *RTLS* are used together to identify the products.

On the other hand, some studies review that when launching an RFID system, there are some

implementation issues with RFID, related to issues seen in other environments. Generally, the main issue considered is inventory or *return-on-investment (ROI)* such as *cost of tags, tag readers, application of tags, software development, and system maintenance* (Cho et al., 2013, p. 4). In addition, another common issue in the implementation of RFID is the actual requirement and types of systems used in the environment. Depends on the requirements and the type of system, the purchasing cost and initial installation of the RFID can be excessive. However, with the implementation of the new technology improves the efficiency and performance of the systems, tracking and tracing the product, stock control and inventory. In current business, RFID technology has already implemented and made important variation in accordance to efficiency, performance, and tracking in many industrial environments.

a) ROI on RFID

The study shows that, the implementation of an RFID cost is complex task and requires a lot of money to invest ranging from \$9 million to \$25 million in *hardware, software, consulting services, and labor* (Ting et al., 2011, p. 11). The resources of the devices can be trace through the RFID tags and observe their maintenance. The administrators and professionals with the keystrokes of the RFID technology can locate all devices. Most common issue around the world is the equipment rentals and advertisement, but with the implementation of RFID, businesses have improved the resource utilization rates and equipment shrinkage has drop down from \$150,000 per year to zero (Kohler, 2012).

The system that composed of development framework concerns in three propositions such as preparation, implementation, and maintenance that identified significantly to affect the industry through the implementation of RFID technology successfully. During the preparation stage, it mainly focuses on the planning, analyzing, hardware selection, and installation. The next stage is to implement the system design according to the environment and apply security and document policies. Lastly, maintenance stage is used for the system in order to monitor, evaluate the performance, and update the system with further extensions. The changes in the document polices of the services enhance the system alterations that need to be fit according to the organization. Therefore, RFID improves the safety, productivity, and track and trace the products.

IV. CONCLUSION

The implementation of the *RFID* system in various industries is an intricate task in the aspect of approval of budget from top management. The purpose of the RFID system is to integrate the technology into different services to identify the products and reduce the

waste to improve efficiency. To reduce the error from the human mistakes, increase productivity, stock control, efficiency, safety, and track and trace the products this new technology can emerge into *logistics and supply chain visibility* sector. For the better accomplishment in this sector, the RFID application is most important to save the resources and reduce number of errors. Therefore, RFID technology in *IT services* intended to assist the managers in implementing RFID to several processes for the safety, inventory, tracking the product details, and *stock control*.

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APPENDIX

RFID usage in the IT environment maximizes the efficiency, productivity, and reduces the wastage. With the impact of RFID technology, the system can identify and track the instruments as well as product details with the help of real time location systems (RTLS).

Having RFID technology, the system can identify and track the instruments and product details with the help of RTLS devices.