

How Radio Frequency Identification (RFID) can revolutionize the Supply Chain Management

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SHORT COMMUNICATION

Radio Frequency Identification (RFID) has emerged as one of the most revolutionary tools in supply chain and logistics. The technology is capable of helping organizations cut down on their expenses and hence become more competitive in the market. RFID uses radio frequency electromagnetic fields for data transfer. According to Sindi and Roe [1], it can be used in a number of ways to monitor the activities of a company in real time. The technology is highly valued due to its quality and adaptability in Supply Chain Management (SCM). RFID technology tracks assets such as the individual boxes, Individual items and even a bigger unit of measure in a supply chain operation. This paper focuses on the value of RFID in warehouses and ways through which it can be used together with blockchain technology to improve supply chain management and logistics. Please refer to the blockchain article [2,3], that outlines the emerging benefits of implementing blockchain.

Companies operating in the supply chain and logistics sector have realized the value of RFID in running their internal operations and improving business operations. Therefore, they have been able to harness the strengths of this technology to improve customer satisfaction. Studies showed that by the end of 2014, the RFID market was expected to exceed a value of \$8.25 billion, which is nearly 14% compound annual growth rate [4]. Today, companies have become heavily reliant on RFID technology in running their supply and logistics operations. According to Sindi and Roe [1], the ability of a company to figure out the consumer's buying habits creates quality service, order accuracy, shrinkage rates, and stock outs. RFID technology has also helped in improving collaboration in various workplaces, hence creating order in the workflow.

RFID technology is very useful in warehouses. This is because it has the power to decrease human error and keep tabs on various activities of the warehouse operations thus contributing the supply management toolbox. The technology also facilitates the organization of inventories, thereby revolutionizing the previous paper and pen system tracking the management [5]. When the shipment arrives, the boxes or pallets are fitted with an RFID tag or

chip. The RFID tag or chip contains internally stored data which is mainly the internal storage information gathered as the boxes move through different processes in the warehouse. The data can also be modified through the process as it is transmitted to a central database for further analysis by the management [5]. Most importantly, RFID has revolutionized the previous barcodes system in warehouse management.

Barcodes require scanning. This means that manual labor is required in reading each of the boxes. Unlike barcodes which scans information from one item to another, RFID can examine the goods hidden behind other products. Warehousing companies prefer RFID because of its accuracy in data transmission and hence the elimination of human errors. Using RFID in the warehouse promotes immediacy because the management software is updated in real time. This helps to keep track of when the item arrives and leaves the warehouse [4]. Track keeping in a warehouse company is important as it helps to promote efficiency and effective communication between various departments. For instance, items with RFID tags can directly communicate with the warehouse on the exit and arrival time, hence creating ease on the pick and pack hours. The technology is beneficial to the management of the warehouse facility as it reduces costs and boosts speed by increasing accuracy. Eventually, this improves the quality of service to customers [4]. However, to attain the best out of an RFID system, the warehouse should identify its most significant pressure points and then choose the most suitable options to eliminate them.

RFID in conjunction with blockchain ensures that transactions made between the sellers and their clients are private and secured. Initially, the blockchain system was adapted to secure unauthorized purchases and shipping thus allowing anonymous transactions. The blockchain system is synonymous to a regular ledger whereby transaction information is entered chronologically thus preventing the manipulation of data through encryption [6]. The chain of information created is decentralized in such a way that no one has control over the chain. This helps to ensure that all the participants involved in the chain have the same information. Any alterations done on the transactions can easily be detected.

Firms that operate warehouses have joined the system of secure

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ledger framework in order to provide the transmission of unaltered data recordings. For instance, in 2017, IBM announced that the Trade Lens Blockchain had achieved more than 154 million events through a collaboration of approximately 90 organizations [7]. The number is expected to rise after the addition of another one million events. RFID in conjunction with blockchain enables the system to integrate different participants in the supply chain network including suppliers, the customers, stakeholders, regulatory agencies hence providing high degrees of accuracy [6]. The system also helps to solve issues related to cross-border payments.

Retailers form the highest category of users of warehouse services. The sector has an estimated value of \$3.8 trillion in sales every year thus contributing approximately 11.7 percent of the U.S employment (Zion Market Research, n.d) [7]. RFID technology has revolutionized the retail industry by ensuring that it keeps up with globalization, aggressive competition, customized demands, and shorter product life cycle. Many supply chain and retail companies continue to tap into the RFID technology to optimize their supply chain systems through just in time deliveries. RFID technology eliminates stock-outs in the supply chain by tracking the location of the product throughout the entire supply chain system. Without RFID, the retail and supply chain services would not achieve progress in its services and payment systems. With the growing demand for the supply of consumable products in the retail business, agility is a primary requirement for the attainment of maximum results (Zion Market Research, n.d) [7]. For example, retail companies that ship perishable goods require dexterity and faster payments. Therefore, such industries will not progress without RFID and blockchain technologies.

RFID and blockchain technologies have also proved to be highly compelling to the supply chain management network. This can be attributed to their abilities to identify, locate, track, and monitor every item and product that is being shipped in and out of the warehouse. The previous system required that the items placed in conveyances such as trailers and containers to be opened first for reading and confirmation [8]. The process requires manual labor thus increasing the delivery time for the products. With the growing demand for the supply of various products for manufacturing and retail purposes, such a procedure not only slows down the business but also lags behind the current demands for consumerism. Besides, the management of the supply of perishable goods will not achieve its full potential without the RFID technology [1]. The active RFID tags embedded in the item allow the transmission of the operating procedures from a paper-based system to a computer or operator in charge, hence providing a forum for capturing consumer feedback. The information captured is sent back to the management for action in improving the quality of services.

The main significance of RFID in supply chain management and logistics is that it provides a quantum leap in the improvement of various management methods thus providing solutions to industries facing low margins. Improved inventory in the management maintains low costs while at the same time offsetting

repeated losses of stock that may occur due to theft, fraud, and shoplifting [1]. Data inaccuracy is a common problem in systems that utilize the traditional manual methods. According to Eggers, et al. [9], in 2004, errors in data management had resulted in \$31 billion of losses in the US supply chain management system. The end results were lost sales and dissatisfied customers.

In conclusion, RFID technology could be very critical in the prevention of data inaccuracies. It prevents companies from collecting incorrect or outdated data used lading bills and invoices. This helps to prevent delivery errors and lost sales. With the incorporation of blockchain technology, data security can be improved in more details. The decentralization of the data allows the organizations in the supply chain and logistics industry to keep track of the events in real time, hence ensuring traceability and accountability. Warehouses assemble different products for shipping and deliveries after collecting them from different suppliers. The tag embedded on the products detects handling and moving information as well as specific storage descriptions of the products. When the product is ready for picking, the RFID tag provides the storage location for retrieval. After retrieval, the product becomes viable for shipping the checking, packing, and loading into the allocated transport unit. All the information required is securely stored to the payment stage where it is rendered upon delivery. RFID is an important technology in the warehouse and the supply chain management and logistics as it offers convenience, efficiency and agility.

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