

A Study Of Rfid Technology With Respect To Supply Chain Management In Retail Industry

Laxmi^{1*}, Dr. Noria Farooqui²

^{1*}Research Scholar, Department of Management, School of Management and Business Studies, Jamia Hamdard, New Delhi-110062

²Associate Professor, Department of Management, School of Management and Business Studies, Jamia Hamdard, New Delhi-110062

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ABSTRACT

Retail industry is the fastest changing industry that contributed to the growth of the retail sector through RFID technology. A well-managed RFID save our lot of energy and time. RFID labels play a crucial role as an inventory tracking technology. RFID significantly reduced Operating Costs, Improved Quality, Accurate Asset Tracking, Improved Information Accuracy, Reduced shrinkage, Lower Inventory and better In-Stock position etc. Radio frequency identification is a growing technology that is more and more being used in the management of supply chain. RFID technology plays an effective role in supply chain processes because of their ability to trace, identify and track information throughout the supply chain. The technology provide suppliers, manufacturers, distributors and retailers precise real time information about the products. The primary objective of this paper is to verified Radio frequency identification technology contributing to the growth of retail sector. The main contribution of this study is to explain RFID in the success of supply chain management and retail.

Keywords: Technology, Retail, RFID, RFID Market, Supply Chain Management, Modern Retail.

Introduction

Technology is influencing retail practices, particularly in the area of Retail management. The emerging technology is Radio frequency identification device (RFID) (Weitz, 2012). Radio-frequency identification (RFID) is a technology used to capture the presence of an item using radio signals. It is used for timing sporting events or inventory control. RFID is a complement for distant reading of codes not a replacement for barcoding. The technology is used for automatically figuring out a person, a package or an item. RFID is a fast developing technology that uses radio waves for data collection and transfer; it capture data efficiently and automatically without human intervention (Wen Yao, 2010). In recent years, RFID technology is being used in diverse applications: from inventory tracking to building access (Xiaowei Zhu, 2012). RFID provide more usable data with inventory, manufacturing equipment, company processes and asset management when companies track their supply chain workflow. When used properly, the generated data can help streamline these areas of the supply chain through automation (redwood, n.d.). RFID helps in track the movement of merchandise across the supply chain, where it is stored whether in a retailer's distribution Centre, and manufacture's warehouse or in a store (Chetan Bajaj, 2010). Radio Frequency Identification technology is more superior than the barcode technology that reduced manual intervention and thus errors effectively (Bhattacharya, Impact of RFID on the Retail Value Chain: An Exploratory Study Using a Mixed Method Approach, 2012). RFID's automatic scanning ability reduce product scanning error rates and product scanning manpower, which lead to increased labor productivity (Seungjae Shin, 2015). Radio frequency identity system (RFID) is an era and aids computer systems or machines to identify objects, record metadata or control individual target through radio waves (Xiaolin Jia Q. F., 2012). Radio-frequency identity (RFID) is an identity approach that makes use of electromagnetic waves to transmit facts from a tag to a reader device (Gaukler, 2010). A radio frequency identification (RFID) system is a special kind of sensor network to identify an object or a person using radio frequency transmission (Yang Xiao, 2007). RFID lower operational costs by streamlining the tracking of stock, sales, and orders. When utilized in aggregate with automated databases and stock control, connected thru virtual communicate networks throughout a international set of locations, RFID can pinpoint man or woman gadgets as they circulates among factories, warehouses, vehicles, and stores (Want,

2006). RFID gives rapid statistics series with particular identity of items with particular IDs without line of sight, for that reason it is able to be used for identifying, locating, monitoring and tracking physical objects (Fusheng Wang, 2006). RFID is being used for a wide variety of applications ranging from the familiar building access control proximity cards to supply chain tracking, toll collection, vehicle parking access control, retail stock management, ski lift access, tracking library books, theft prevention, vehicle immobilizer systems and railway rolling stock identification and movement tracking etc. (Roberts, 2006). Radio frequency identification (RFID) is a technology that is used to communicate with identified objects using radio waves, so that the objects can be recognized, tracked and traced (Peter Jones, 2005). RFID is a rapidly developing technology which uses RF signals for automatic identification of objects (K. V. Seshagiri Rao, 2005).

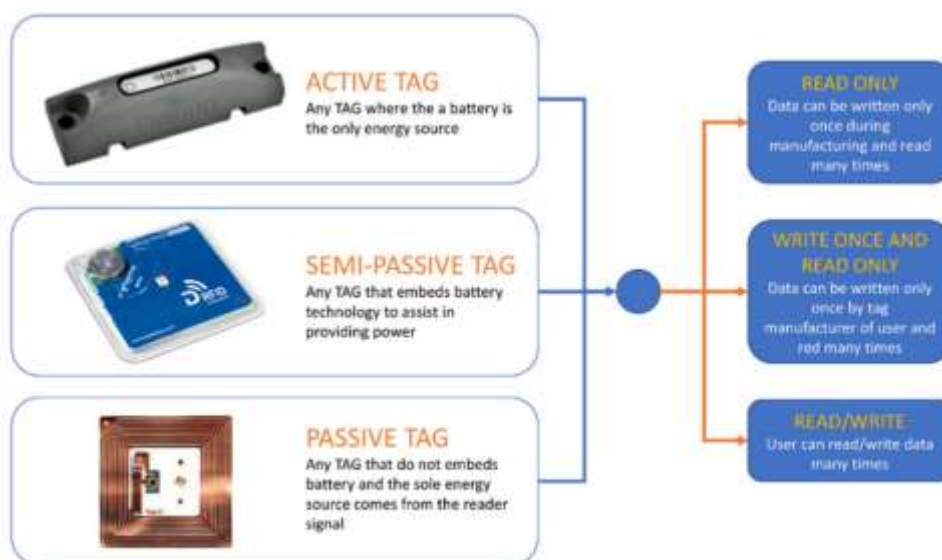
THE TECHNOLOGY BEHIND RFID

RFID technology is composed of an RFID tag and an RFID reader linked to a computer system. The tag is the part that collects real time data and then transmits that data via radio waves. The tags usually have two parts, a small chip and an antenna. Information is stored and processed by the chip while the antenna is used to receive and transmit the information. The chip is used to store information about a product or a shipment. The object, product or shipment that is being tracked, is provided with a unique identifying number. This number is a part of the information that is stored in the chip that is embedded in the tag. All the relevant information about the object is gathered and stored in the chip. This information is read by an RFID reader when a tag passes by it. The information stored in a RFID tag is recorded and detected through the reader. The reader thus tracks the physical movement of the tag and thereby that of the object to which the tag is attached. The reader, thus, can track the tag's movement in real time and pass its digital identity and other relevant information to a computer system (Xiaowei Zhu, 2012).

The main components of an RFID system include the hardware (tags, readers and antennas) and the software systems. RFID tags can be passive or active, depending on powering techniques. Passive tags can only communicate with the reader when they are sitting in an electromagnetic field of the reader since they do not have battery power; while active RFID tags can power the integrated circuits and broadcast the response signal to the reader (Wen Yao, 2010). An RFID Tag & an RFID Reader are two major components of ideal RFID system (Lahoti, 2019). The main components in RFID systems are the tag, the reader, and the RFID middleware that translates and integrates data for enterprise applications (RFID in Supply Chain Management, 2017). RFID networks consist of a extensive variety of automation technologies. These technologies are RFID readers, RFID writers, RFID barcode scanners, RFID smart sensors and RFID controllers (Inanc, 2007). These tags comprise transponders that emit messages readable with the aid of using specialised RFID readers. Most RFID tags store some sort of identification number; for example a customer number or product SKU (stock-keeping unit) code. A reader retrieves statistics approximately the ID quantity from a database, and acts upon it accordingly. RFID tags also can incorporate writable memory, which may shop data for switch to numerous RFID readers in one of a kind locations. This information can track the movement of the tagged item, making that information available to each reader (Weinstein, 2005). RFID reader transmits a modulated RF sign to the RFID tag inclusive of an antenna and an incorporated circuit chip. The chip receives power from the antenna and responds by varying its input impedance and thus modulating the backscattered signal (Rao, 2006).

TYPES OF RFID TAGS

RFID tags is categorized into two parts, active and passive, relying on their supply of electrical power (Weinstein, 2005). Two types of RFID tags are in use: an active RFID tag which contains its own power source like a battery, and a passive RFID tag with no battery. For the passive RFID tag, the power comes from the signal transmitted by the antenna. On the other hand, the active RFID tags are equipped with internal power supply, which powers the chip and to broadcast the signal back to the RFID reader. Generally, the active tags have larger memories than the passive tags and have a much larger range of operations. Naturally the passive tags are cheaper than the active tags. The term RFID tag is used as a general term for tags, labels and cards. Passive tags can use three types of frequencies: UHF (ultra-high frequency), HF (high frequency) and LF (low frequency). When Wal-Mart mandated their suppliers to use RFID, they required UHF passive tags to be used. Their range is typically 20–30ft. They are faster, but use more power. The HF tags have ranges less than 3ft and work better on objects made of metal. The LF tags use less power and can penetrate non-metal objects better but have range only about a foot (Xiaowei Zhu, 2012).



(b)

Source : (Alessia Condemmi, 2019)

RADIO FREQUENCY IDENTIFICATION IN SUPPLY CHAIN MANAGEMENT

Radio Frequency Identification era has led to a new degree in SCM, the usage of current barcode era (McCathie, 2005). RFID technology, a wireless Automatic Identification received great attention in the retail supply chain (Seungjae Shin, 2015). RFID technology can be used to create end-to-end supply chain information visibility by enabling supplier, manufacturers, logistics providers and retailers to track and trace item-level information through the entire supply chain at any time and at any location (Xiaowei Zhu, 2012). Radio Frequency Identification technologies are extensively followed to number of programs to facilitate the personal computing services, and the physical transactions in business such as RFID-enabled supply chain (Yudai Komori, 2017). Radio frequency identification (RFID) is the rising era this is more and more being utilized in supply chain management. RFID technology plays an important role in supply chain processes because of their ability to identify, trace and track information throughout the supply chain. The technology provide suppliers, manufacturers, distributors and retailers precise real time information about the products. This accurate knowledge of the inventory would result in lower labor cost, simplified business processes and improved supply chain efficiency (Xiaowei Zhu, 2012). RFID gains increasing popularity in supply chains and retail stores for processes such as inventory management, there is an increasing interest in RFID processes in retailing environments to facilitate overall improved customer shopping experience also (Piramuthu, 2013). RFID used for automatic real-time data capturing at each stage of a supply chain (Jung Lyu Jr., 2009). RFID is widely known as a supply chain aid that greatly reducing or eliminating employee theft in the supply chain (Pfleuger, 2008).



Source : www.clouitech.com

RFID advantages production providers with operational efficiencies and incorporated supply chains. RFID also provides greater visibility of goods in both the internal and external supply chain network (RFID in Supply Chain Management, 2017). RFID enable complete tracking of an item, thus potentially creating complete visibility of item progress through manufacturing, distribution, storage and inventory, and retail environments. This information, in turn, can be used to streamline supply chain operations (Gary M. Gaukler, 2007). RFID gives tantalizing advantages for supply chain management, stock control, and plenty of different applications. In supply chain management, RFID tags are used to track products throughout the supply chain—from supplier delivery, to warehouse stock and point of sale. New programs goal monitoring from checkout via purchaser billing. A central database records product movement, which manufacturers or retailers can later use for location, delivery confirmation, or theft prevention (Weinstein, 2005).

CHALLENGES OF RFID IN SUPPLY CHAIN MANAGEMENT

RFID is not without its challenges, which arise from both a technological and usage point of view (Weinstein, 2005).

- **Excessive Value**

To implement a successful RFID system, a valuable cost occurs. The software program and hardware required for RFID are valuable components. Also, the maintenance cost cannot be ignored (Lahoti, 2019). RFID is extra highly-priced than bar codes, and issues can arise while the usage of the tags on steel objects. The size of the chip needs to be reduced for reduce tag cost (Attaran, 2012).

- **Collision Problems**

Electromagnetic interference affects the communication among tags and readers. In case of Simultaneous transmissions in RFID results in collisions as readers and tags generally function on a same wireless channel. Therefore, efficient anti-collision protocols for identifying multi-tags simultaneously are of great importance for the development of large-scale RFID applications (Xiaolin Jia Q. F., 2010).

- **Lack of Understanding**

The maximum benefits can be harnessed by understanding the RFID technology completely. For this, a deep understanding of the various tags and frequencies is required. It has been found that lack of in-house experts, companies fail to provide adequate training about RFID to their employees (Lahoti, 2019).

- **Technical Problem**

In Implementation of RFID, a few technical issues exit. The system works inaccurately during RFID tag or reader collisions (Lahoti, 2019). The proportion of defective tags and false reads has been as high as 20–50%, is still not acceptable (Cooke, 2005) (Tajima, 2007). As greater tags and readers come into use, troubles which includes reader collision (the collision of indicators from a couple of readers), tag collision (the opportunity of a couple of tags difficult a reader), and interference from other wireless devices (e.g., cell phones) need to be addressed (Twist, 2005). Also, the RFID device does not work properly while it comes in touch with liquid and steel items.

- **Security Issue**

Safety difficulty is concerned with Wi-Fi networking technology on which RFID is primarily based. The data Collection, storage and transmission of data in database record - the whole process need to be absolutely secured. While using this system, it has been observed that many RFID vendors face security issues (Lahoti, 2019).

BENEFITS OF RFID IN SUPPLY CHAIN MANAGEMENT

In today's developing world, Radio Frequency Identification (RFID) is one of the fastest wireless technology which offers great benefits for identifying and tracking objects in wide application areas (Kaddour, 2012). Radio-frequency identification (RFID) is a sensor technology that has attracted much attention in the supply chain area (Gary M. Gaukler, 2007). Radio Frequency Identification (RFID) technology has opened the door to a new era in SCM (McCathie, 2005). The collection of real-time data on individual items become a reality, which was not possible with the use of bar codes (Tajima, 2007).

- ❖ **Enhanced Visibility:** RFID enables real-time tracking of products throughout the supply chain, providing organizations with accurate and detailed information about every item. The ability to use this information to improve efficiency. Get real-time information using smart shelves with built in RFID receivers (McCathie, 2005) (Attaran, 2012).
- ❖ **Inventory Reduction:** RFID can reduce safety stock by improving inventory data and reducing stockouts (Schell, 2004). RFID can further reduce inventory by making it easier to manage supplier-managed inventory, on-time delivery and automatic replenishment using smart shelves (Tajima, 2007).
- ❖ **Accurate Asset Tracking:** RFID technology aids in tracking assets such as tools that cannot detect tag. RFID also improves asset utilization by tracking movement, use and placement. RFID can help transportation and logistics organizations accurately track these valuable assets (McCathie, 2005) (Attaran, 2012).

- ❖ **Quality Control:** RFID technology collects real-time information about the manufacturing process for quality control purposes, reducing the chance of customers receiving defective products and reducing the time spent monitoring and reworking orders (McCathie, 2005; Attaran, 2012).
- ❖ **Labour Reduction:** RFID track pallets, containers and cartons with sensors which otherwise involve labour intensive physical verifications at the stores (Chetan Bajaj, 2010). Decreases in labor cost can be achieved by reducing the physical counting of inventory and product scanning-error rate (Seungjae Shin, 2015).
- ❖ **Improved information sharing:** RFID enhances the exchange of product and supply chain data between trading companies. With access to detailed supply chain data, RFID enables a universal exchange of information by customizing the level of aggregation or breakdown of supply chain data. (Tajima, 2007).
- ❖ **Reduced Stock outs:** The reduction in stock outs allows retailers to focus on promotion tracking and execution, price differentiation strategies, category management, and new product launches and shelves, all of which can be supported by the use of RFID. Real time merchandise tracking enables more accurate inventory and reduces possibility of stock outs (Chetan Bajaj, 2010).

ROLE OF RADIO FREQUENCY IDENTIFICATION (RFID) IN RETAIL

RFID is a technology that uses an embedded chip to receive transmit and information. Today, RFID technology is one of the most exciting developments in retail. It help us to compete with our competitors (technologies, 2022). Retailers see RFID technology has one potential means of staying competitive and achieving profitability both in the short as well as in the long term (Bhattacharya, A conceptual framework of RFID adoption in retail using Rogers stage model, 2015). The adoption of radio frequency identification (RFID) create a revolutionary change in the management of retail sector (Ngai, 2008). RFID use in a retail store creates an information trail that combines location recordings, routes through the store, and interactions with products. Retailers can aggregate and mine this data for patterns and consumer routines to help customers navigate the store, particularly important for megastores and to develop individualized offers and promotions (Roussos, 2006). When RFID technology is adopted in a retail store, sales transactions can take place instantly through the RFID reader at the cashier's counter, thus preventing long payment queues and enriching the shoppers' shopping experiences. RFID technology can also improve the level of security within the store by detecting if items that are not being paid for are being removed from the shelves (Peter Jones and Colin Clarke-Hill, 2005). RFID tags act as indices into database payment records, and help retailers track the line of defective items. RFID also enabled payment devices and transmit receipts to their mobile phones (Juels, 2006). RFID allows automatic tamper checking of multiple products from a distance, eliminating the need to directly inspect each item (want, 2004).

RFID Market forecast to 2030



The global RFID Market in terms of revenue was estimated to be worth \$15.8 billion in 2023 and expected to reach USD 35.6 billion by 2030. It is expected to grow at a CAGR of 11.9% during the forecast period (MARKETSANDMARKETS, 2022)

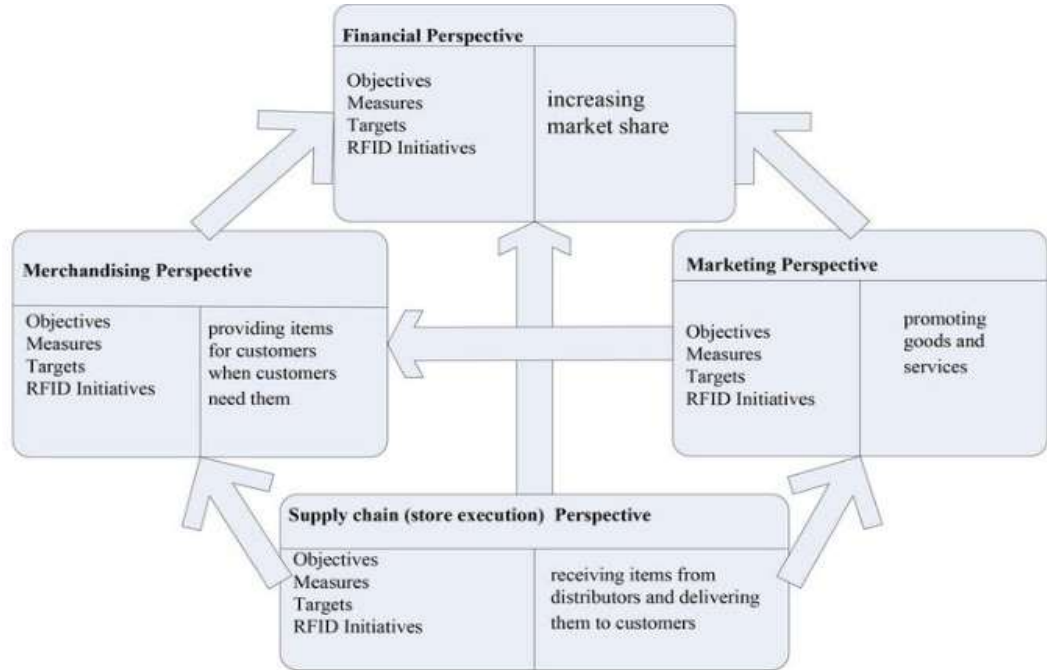
RFID BENEFITS IN RETAIL

The RFID technology's advantages to retailers were visualized early at the beginning of the 21st century. RFID technology enhances product visibility in store operations and across the supply chain through the ease of reading RFID tag information and updating inventory records on a real-time basis (Kasiri, 2021). Studies have investigated RFID advantages in extraordinary regions of retail operations, which include supply chain management, and display how stock inaccuracy and therefore out-of-inventory situations are progressed with the implementation of RFID across the supply chain (Hardgrave, Langford, Waller, & Miller, 2008). Enhanced

information visibility, provided by RFID in the supply chain, decreases uncertainties and lowers high inventory costs associated with the uncertainties (Kasiri, 2021).

The applications of the RFID technology go beyond only inventory management and tracking items throughout the supply chain. As per balanced scorecard, it is seen that RFID advantages extend to marketing and merchandising operations in retail as well (Kasiri, 2021).

Balanced scorecard for RFID applications in retail



In marketing, stores keep an eye on the behavior of consumers better when customers use tools such as smart dressing rooms or smart carts provided by RFID. Retailers can study about consumers' preferences and reflect that in the promotion and advertising offered to customers in real time as they shop. The available tools such as smart carts and smart dressing rooms also enhance customer shopping experience. The use of these tools allows customers to find their desired items more easily and faster, which eventually leads to increase in sales and higher customer satisfaction.

In merchandising, RFID help retailers to identify better assortments of products for enhanced visibility on consumer behavior in stores. Moreover, an enhanced visibility means better shelf-replenishment that helps stores to reduce the shelf space since enhanced visibility on shelves allows retailers to replenish them as soon as they become emptied. Less shelf space results in holding less number of products on shelves at any given time and therefore much less inventory and capital held in stores, which allows retailers to invest in carrying more variety for products in stores (Kasiri, 2021).

CONCLUSION

The main contribution of paper is to recognize the RFID benefits in supply chain management and retail. We have examined that RFID technology affected supply chain processes and has opened the new era in SCM. The research also suggests that supply chain Structure of an organization becomes more highly developed. When supply chain structures are Underdeveloped, they constitute a barrier for retailers to access suppliers and stores in a timely and efficient manner. An organization should focus on customer relationship management, customer service and demand management, product development, order fulfillment and returns management to manage SCM effectively. Despite of challenges, RFID benefits and success variables that firms are able to gain by embracing RFID in their supply chains. Modern retail format like Big Bazaar, Reliance Retail, Vishal Mega mart, Max fashion Shoppers Stop, Spencer, life styles etc. are using RFID technology that help to Enhanced visibility along the supply chain, Lower Inventory, Accurate Asset Tracking, Improved Information Accuracy, Reduced Operating Costs, Improved Quality, etc. RFID technology also plays an important role in helping organizations, asset tracking, inventory management, solve problems in supply chain management, security and more, and providing new solutions to industries. RFID benefits also extend to marketing and merchandising operations in retail as well that help retailers to enhance visibility on consumer behavior in stores and to identify better assortments of products. This paper is relevant to all Organizations, retail formats, enterprises involved in optimizing their supply chains through RFID implementation.

References

1. Alessia Condemi, F. C. (2019). An Opportunity from RFID TAGs. *Department of Industrial and Information Engineering and Economics, University of L'Aquila, Italy*, 9(16).
2. *An Overview of Supply Chain Management*. (2022). Retrieved from Fibre2fashion websie: <https://www.fibre2fashion.com/industry-article/5123/an-overview-of-supply-chain-management>
3. Andres Cuneo, S. J.-F. (2015). The Growth of Private Label Brands:A Worldwide Phenomenon? *Journal of International Marketing*, 72-90.
4. Angeles, R. (2005). Rfid Technologies: Supply-Chain Applications and Implementation Issues. *Information Systems Management*, 51-65.
5. Attaran, M. (2012). Critical Success Factors and Challenges of Implementing RFID in Supply Chain Management. *Journal of Supply Chain and Operations Management*, volume 10.
6. Bhattacharya, M. (2012). Impact of RFID on the Retail Value Chain: An Exploratory Study Using a Mixed Method Approach. *Journal of Technology Management & Innovation* , 36-49.
7. Bhattacharya, M. (2015). A conceptual framework of RFID adoption in retail using Rogers stage model. *Business Process Management Journal*, 517-540.
8. Chetan Bajaj, R. T. (2010). *Retail Management*. New Delhi: Oxford University Press.
9. Dirk Hihnel, W. B. (2004). Mapping and Localization with WID Technology. *IEEE International Conference on Robotics & Automation*, 1015-1020.
10. Fernando, J. (2022, january 29). *Supply Chain management*. Retrieved from Investopedia: <https://www.investopedia.com/terms/s/scm.asp#:~:text=Supply%20chain%20management%20is%20the,competitive%20advantage%20in%20the%20marketplace>.
11. Fusheng Wang, S. L. (2006). Bridging Physical and Virtual Worlds: Complex Event Processing for RFID Data Streams. *Advances in Database Technology-EDBT 2006: 10th International Conference on Extending Database Technology*, 588-607.
12. Gary M. Gaukler, R. W. (2007). Item-Level RFID in the Retail Supply Chain. *Production and operations management*, 65-76.
13. Gaukler, G. M. (2010). Preventing avoidable stockouts: the impact of item-level RFID in retail. *Journal of Business & Industrial Marketing*, 572-581.
14. Hardgrave, B. C., Langford, S., Waller, M., & Miller, R. (2008). Measuring the impact of RFID on out of stocks at Wal-Mart. *MISQE*, 181-192.
15. Inanc, Z. P. (2007). Smart Parking Applications Using RFID Technology. *1st Annual RFID Eurasia IEEE*, 1-3.
16. Juels, A. (2006). RFID Security and Privacy: A Research Survey. *IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS*, 381-394.
17. Jung Lyu Jr., S.-Y. C.-L. (2009). Integrating RFID with quality assurance system – Framework and applications. *Expert Systems with Applications*, 10877-10882.
18. K. V. Seshagiri Rao, P. V. (2005). Antenna Design for UHF RFID Tags: A Review and a Practical Application. *IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION*, 3870-3876.
19. Kaddour, Y. D. (2012). RFID potential impacts and future evolution. *ELSEVIER*, 91-98.
20. Kasiri, N. (2021). RFID Applications in Retail. *Electromagnetic Wave Propagation for Industry and Biomedical Applications*.
21. Kiron, M. I. (2021, june 28). RFID Technology in Textile and Clothing Supply Chain Management.
22. Lahoti, N. (2019, December 19). *How RFID Is Changing The Future Of Logistics And Supply Chain Management?* Retrieved from Truckpulse website: <https://mytruckpulse.com/blog/rfid-in-supply-chain-management-and-logistics.html>
23. Liwen Chen, S. M. (2011). Private Labels: Facilitators or Impediments. *The Authors Decision Sciences Journal*, 32.
24. MARKETSANDMARKETS. (2022). *RFID Market*.
25. McCathie, K. M. (2005). The pros and cons of RFID in supply chain management . *faculcy of engineering and information science*, 9.
26. Ngai, K. M. (2008). The adoption of RFID in fashion retailing: a business value-added framework. *Industrial Management and Data System*, 596-612.
27. Pavel V. Nikitin, K. V. (2007). An Overview of Near Field UHF RFID. *IEEE International Conference on RFID*, 167-174.
28. Peter Jones and Colin Clarke-Hill, D. H. (2005). The benefits, challenges and impacts of radio frequency identification technology (RFID) for retailers in the UK. *Marketing Intelligence and planning*, 395-402.
29. Peter Jones, C. C.-H. (2005). Radio frequency identification and food retailing in the UK. *British Food Journal*, 356-360.
30. Pfleuger, J. V. (2008). RFID in retail: a framework for examining consumers' ethical perceptions. *International Journal of Mobile Communications*, 53-66.
31. Piramuthu, P. U. (2013). Framework and Authentication Protocols for Smartphone, NFC, and RFID in Retail Transactions. 77-82.

32. Rao, P. V. (2006). Performance Limitations of Passive UHF RFID Systems. *IEEE Antennas and Propagation Society International Symposium*, 1011-1014.
33. redwood. (n.d.). *Is RFID Still Useful to the Supply Chain?* Retrieved from Redwoodlogistic: <https://www.redwoodlogistics.com/rfid-in-the-supply-chain/>
34. *RFID in Supply Chain Management*. (2017, august 14). Retrieved from Hopeland website: https://www.clouiotech.com/blog/rfid-in-supply-chain-management_b34
35. Roberts, C. (2006). Radio frequency identification (RFID). *Computers and security*, 18-26.
36. Roussos, G. (2006). Enabling RFID in retail. *IEEE Computers*, 25-30.
37. S, S. (2021, Feb 21). *Can Private Labels Become Big Enough To Make Ecommerce Profitable In India*. Retrieved from INC42: <https://inc42.com/features/can-private-labels-become-big-enough-to-make-ecommerce-profitable-in-india/>
38. sellerapp. (2022, march 21). *How to Manage the Supply Chain of Your Private Brand on Amazon*. Retrieved from sellerapp: <https://www.sellerapp.com/blog/private-brand-supply-chain/>
39. Seungjae Shin, B. E. (2015). An Empirical Study of RFID Productivity in the U.S. Retail Supply Chain. *Int. Journal of Production Economics*, 89-96.
40. Singh, D. H. (2009). *Retail Management a global perspective*. New Delhi: S. Chand & Company Ltd.
41. Tajima, M. (2007). Strategic value of RFID in supply chain management. *Journal of Purchasing & Supply Management*, 261-273.
42. technologies, A. (2022, september 13). RFID Technology Solutions for Retail Businesses.
43. want, R. (2004). Enabling Ubiquitous Sensing with RFID. *Computer*, 84-86.
44. Want, R. (2006). An Introduction to RFID Technology. *IEEE Pervasive Computing*, 25-33.
45. Weinstein, R. (2005). RFID: a technical overview and its application to the enterprise. *IT Professional IEEE*, 27-33.
46. Weitz, M. L. (2012). *Retailing Management*. florida: McGraw-Hill.
47. Wen Yao, C.-H. C. (2010). The Use of RFID in Healthcare: Benefits and Barriers. *IEEE International Conference on RFID-Technology and Applications*.
48. Xiaolin Jia, Q. F. (2010). An Efficient Anti-Collision Protocol for RFID Tag Identification. *IEEE Communications letters*, 1014-1016.
49. Xiaolin Jia, Q. F. (2012). RFID Technology and Its Applications in Internet of Things (IOT). *2nd International Conference on consumer electronics, communication and networks*, 1282-1285.
50. Xiaowei Zhu, S. K. (2012). A review of RFID technology and its managerial applications. *Journal of Engineering and Technology Management*, 152-167.
51. Yang Xiao, S. Y. (2007). Radio frequency identification: technologies, applications, and research issues. *Wireless communations and mobile computing*, 457-472.
52. Yudai Komori, K. S. (2017). RFID Tag Grouping Protocols Made Private. *IEEE/IFIP International conference on dependable systems and networks workshops*, 105-106.