GSJ: Volume 9, Issue 6, June 2021, Online: ISSN 2320-9186
www.globalscientificjournal.com

Study of the use of RFID Technology and its contribution in managing organization warehouse.

Kawther Abdullah Al-Musllami, Middle East College, Muscat, Sultanate of Oman Wolverhampton University, Wulfruna St, England
By Mr. Panagiotis Nikolaou

1. Abstract

The logistics sector is critical to the Omani economy, as it expands inward investment, non-oil exports, and the country's competitiveness. Logistics is not only a vital factor for companies in Oman but is also an essential sector. Where Omani companies and manufacturers can boost productivity, make them greener, and earn more money through a well-equipped logistics industry. According to (muscatdaily 2021), "the logistics sector in the Sultanate of Oman achieved in 2021 the 14th rank globally, and the third at the level of the Gulf Cooperation Council." Its business-friendly environment as well as world-class transportation and logistics infrastructure makes it a great place to do business. [10]

Logistics plays an important role in the economy as it facilitates the movement and flow of many commercial transactions, an important activity in terms of facilitating the sale of all goods and services. “Because if the goods do not arrive on time, the customers will not be able to purchase them. If the goods do not reach the right place or condition, then no sale can be made” (nust 2021). If the logistics function fails to fulfill this role all economic activities will suffer. across the supply chain. So, the function of logistics management plays an important role in a country's export efforts. [11]

In addition, the warehouse department in any company is considered one of the most important departments because it is the department that communicates with companies that provide the company with important supplies and tools. Therefore, it is important to use technology in warehouses to manage them well and to improve the logistics services in the company. Where technology helps to increase the productivity and efficiency of the warehouse, make the work environment smoother, reduce the number of workers and reduce human errors, increase security in warehouses...etc. There are many leading logistics technologies that improve warehouse management and increase its efficiency, such as “Drones, RFID Tags, AI, GPS, and On-Demand Storage.” (ALLEN.W 2020) [1]

In contrast, this research was focused on the use of RFID technology in warehouses. Where this study targeted to know the role of RFID technology in managing companies' warehouses. The researcher used many methods to gather data and information, regarding primary sources, the researcher conducted an interview with the assistant director of warehouse operations and distributed the survey to 54 workers in the company. On the other hand, the researcher also used secondary sources, where magazines, books and the Internet were used in order to obtain sufficient information related to the topic of the research.

2. Introduction

A warehouse is a commercial space used by producers, importers, exporters, wholesalers, transportation companies, customs, and others in the supply chain. It is widely used in industries such as manufacturing and distribution to store finished goods and raw materials. According to (Interlake Mecalux 2021): " The company's warehouse is a large facility with storage shelves, handling equipment, staff, and management services. This helps workers to monitor both the incoming and outgoing movement of products (received from manufacturers and production centers) (goods being sent to production, and sales)." (Interlake Mecalux 2021). The warehouse is a very important facility for companies as it works to store products and commodities, provide and store production supplies, raw materials and tools to be ready at any time. And, to maintain the stock from damage and loss, and according to (Harrisburg logistics 2018): "warehouse is great Facility for storing product and goods." (Harrisburg logistics 2018). [4] [5]

Technology is a set of techniques, methods, skills and processes used in the production of goods or services or in achieving goals. Technology is used in all businesses of companies in order to complete these works in a short time and little effort. Systems that apply technology by taking inputs and changing them according to the use of the system, and then obtaining the result, are defined as technological systems.

RFID technology, which stands for "radio frequency identification", a technology in which the data encoded in smart labels or RFID tags is captured by a reader using radio waves. On other word, "RFID (Radio Frequency Identification) is a communication-free data exchange between the RFID transmitter and receiver and the RFID writer / reader." (smart-tec 2021). [14]

Although this technology is expensive, it has many advantages as it is a very useful technology for companies' warehouses as it works on; Reducing effort and human errors in the data collection process,

as RFID technology can read many tags at the same time without the need to scan line-of-sight or read item by item, which helps this feature to increase work efficiency. Also, RFID technology can locate products and goods and record them as lost, found, damaged, or transported, as the movement of products can be tracked from the supply chain until it reaches the warehouse. This technology simplifies the processes of receiving and shipping goods. In addition to that, it solves many problems that occur in warehouses, such as inaccurate inventory and product expiration, as well as organizing inventory, and other problems.

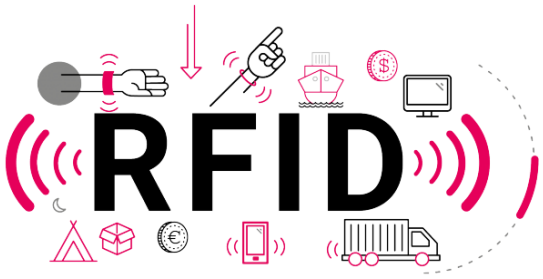

Figure 1: RFID Technology [3]

a. Problem Statement

Most warehouses face many problems, because of all these problems, there is a general difficulty for warehouses in creating vision, in managing warehouses, and in optimizing the company's supply chain. and among the most important and most common of these problems are:

- Inaccurate inventory: It is discrepancies between the actual quantity or type of physical inventory and what is registered or intended to be referred to. In other word, "It's the difference between what's registered in an inventory management system and what's for available in the warehouse." (Lopienski,K 2020) Often this problem is discovered when one of the warehouse workers tries to retrieve a product from a specific location that did not exist, or the worker is directed to store the product in a full location. It causes a waste of time and effort in trying to correct errors. Most of these problems are caused by manual operations, which cause inaccurate data to be produced in the systems.[8]
- Damaged products: Damage to products or goods causes damage to the warehouse, such as generating a cost for warehouse operations. This problem may be caused by damaging the pallet, damage to the stand, damage to the truck, or an unsuitable storage temperature for the product. appropriate exploitation mechanism for it. One of the essential points that lead to loss and failure is not reaching the required number of points in achieving the planned large values in storage practices. On the other hand, is the lack of that ability of organizations to choose the most appropriate way in warehousing information technology practices among employees, so companies and institutions will lose a lot of things, including time, money and effort, for the development of storage practices and their impact on performance among employees.

1. Literature Review

Radio frequency identification or RFID is an emerging technology that enables the readers to store and read large amounts of data without being able to see it from a distance.

The supply chain is the core area where RFID is used (Sooksaksun 2014). It is getting used in various industries such as healthcare, retail, agriculture and government security. In the current era the demand of customer is the high-level differentiation and the short life cycle of products, so the companies need to be more innovative, and the innovation is not done just on their processes but also in the whole warehouse management (Pane, Awangga, and Azhari 2018).

RFID is being implemented for improving the processes in supply chain such as the material handling by better efficacy, effective managing of assets, and product's availability improvement. Product tracking (such as containers, assets, and reusable bins) have become automated by using the RFID extensively throughout the warehouse management. It is predicted that high level innovation is contributed to supply chain by using this technology. [12] [15]

Some retailers have adopted the RFID in USA and Europe. Some major retailers such as Wal-Mart, Metro group and Marks & spencer deployed the RFID in tracking products. Since then, RFID is adopted by many of the retailers including Myer, Tesco, and Mitsukoshi. In supply chain industry the rapid use of RFID offers major research opportunities (Sarac, Absi, and Dauzere-Pérès 2010). [13]

One of the main contributions of RFID is that it makes the warehouse and supply chain management efficient and faster with less errors. RFID can create many benefits in warehouse management. It can provide the warehouse automation, supply chain communication and partnership, visibility of information, higher service of quality, and an overall cost reduction.

First, inventory management and tracking are provided by the RFID from start to end. RFID can also sense the pressure and temperature logging. It will help maintain the temperature of products in warehouse. And help in the reduction of product expiration. Second, as RFID allows the warehouse to place everything electronically by creating the warehouse automated. By information synchronization and physical flow of products across the warehouse the RFID automates the warehouse management (Liu et al. 2019). The returned goods can be tracked using the RFID hence it prevents the counterfeiting at the time of out-of- stock products. The RFID is helpful in warehouse in some specific areas such as the manufacturing, retail, material management and distribution. In material management the RFID reader is fixed at the entrance and reads the products that is being delivered. It will help in storage, handling and routing the information of goods that are incoming and after that the information of the product is updated automatically.[7]

2. Methodology

It is often difficult to choose between qualitative and quantitative research, but after studying the types of research design, the researcher chose the mixed methods research design, that quantitative research is more focused, scientific, and objective, and more rapid in collecting data. In addition to that, large samples are dealt with to obtain accurate, reliable, and correct results, and quantitative research is used to identify, deal with, and develop problems. Also, the researcher chose this type of research design due to the current circumstances that the country is going through (Covid-19), as it is difficult for the researcher to visit the company's headquarters and meet with administrators and employees. on the other hand, the research also chose qualitative research because its description detailed, holistic, so the researcher will not go to the company, just will connect with one of the

employees by using phone or email. The warehouse department is the most important place in the company, as it is linked to all the departments in the company and finances these departments with all the supplies they need. All employees of the company were considered among the target group by the researcher. Where a sample of about 70 employees was taken out of the total 700 employees in the company, because it is not easy to reach all employees in terms of time and resources available to the researcher.

Figures 2. Qualitative Research Design 2019 – Definition & Techniques [9].

Figures 3. Quantitative Research Design [2]

3. Result Analysis

The presence of the latest technologies in the company leads to a significant change in warehouse management, as the results showed that the presence of RFID technology limits the presence of problems and challenges in warehouse management, as this technology works to make the work environment in warehouses safer and smoother. For example, having RFID technology in warehouses reduces human errors, saves time and effort, increases work efficiency, increases productivity and profits...etc.

4. Conclusion and Future Research

Increasing the level of performance of the various logistics work in the company is one of the most important strengths of the company, as it allows the company to enable all the various activities and operations, and achieve the highest levels of efficiency, and thus increases the level of productivity of the company. It leads to great profits and successes. The company has been keen to implement the latest technologies in their warehouses. And he studies focused on knowing the role of RFID technology in managing warehouses of the Company, and how RFID technology can overcome challenges in the workplace. The researcher was able to achieve several basic goals when presenting this study, Where the researcher carried out several analyzes to understand and extract all the results to understand the impact of using RFID technology for warehouse management. Through the results obtained during the study, the application of RFID technology will increase the company's competitiveness and will provide many high-level services.

5. References

[1] ALLEN.W (2020) 6 ways logistics technology is impacting warehousing [Online] available from < https://6river.com/how-logistics-technology-is-impacting-warehousing/ > [5 June 2021]

[2] Blog, F.(2021) 15 Reasons to Choose Quantitative over Qualitative Research [Online] available from < https://www.formpl.us/blog/quantitative-qualitative-research#:~:text=Quantitative%20research%20is%20more%20preferred,and%20approach%20to%20the%20problem. > [14 May 2021].

[3] Etigo (2021) *RFID* [online] available from < https://www.etigo.fr/en/196-rfid > [3 Jun 2021]

[4] Harrisburg Logistics. (2018) THE IMPORTANCE OF WAREHOUSING TO YOUR BUSINESS [Online] available from < https://harrisburglogistics.com/the-importance-of-warehousing-to-your-business/#:~:text=Basically%2C%20a%20warehouse%20is%20great,clients%20start%20putting%20in%20orders. > [13 Apr 2021]

[5] Interlake Mecalux. (2021) What is a warehouse? Our definition [Online] available from < https://www.interlakemecalux.com/warehouse-manual/the-warehouse > [12 Apr 2021]

[6] Ithraa (2020) Briefings from Oman Logistics [Online] available from < https://ithraa.om/portals/0/IthraaPDF/Brochures/PDF/ithraa_briefings_logistics_eng_AW.pdf > [5 June 2021]

[7] Liu, H., Yao, Z., Zeng, L., and Luan, J. (2019) 'An RFID and Sensor Technology-Based Warehouse Center: Assessment of New Model on a Superstore in China'. Assembly Automation

[8] Lopienski,K. (2020) Inventory Accuracy [Online] available from < https://www.shipbob.com/blog/inventory-accuracy/ > [16 Apr 2021]

[9] Mayo, J. (2019) Qualitative Research Design 2019 – Definition & Techniques [online] available from < https://penmypaper.com/blog/qualitative- research/ > [18 May 2020]

[10] muscatdaily (2021) Oman ranks 14th in emerging markets logistics index 2021 [Online] available from < https://muscatdaily.com/Business/389715/Oman-ranks-14th-in-emerging-markets-logistics-index-2021 > [5 June 2021]
[11] nust (2021 (THE ROLE AND IMPORTANCE OF LOGISTICS [Online] available from < https://www.nust.na/sites/default/files/documents/importance%20of%20logistics.pdf > [5 June 2021]
[12] Pane, S.F., Awangga, R.M., and Azhari, B.R. (2018) 'Qualitative Evaluation of RFID Implementation on Warehouse Management System'. Telkomnika 16 (3), 1303–1308
[13] Sarac, A., Absi, N., and Dauzere-Pérès, S. (2010) 'A Literature Review on the Impact of RFID Technologies on Supply Chain Management'. International Journal of Production Economics 128 (1), 77–95
[14] smart-tec. (2021) RFID-Technology [Online] available from < https://www.smart-tec.com/en/auto-id-world/rfid-technology > [14 Apr 2021]
[15] Sooksaksun, N. (2014) LogForum. (October) [20 Apr 2021]