International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)
doi : https://doi.org/10.32628/IJSRSET207449

The Integrated Exchange of Information and IoT for Smart Logistics Systems

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Article Info
Volume 7 Issue 4
Page Number: 140-145
Publication Issue :
July-August-2020

Article History
Accepted : 20 July 2020
Published : 30 July 2020

ABSTRACT

The logistics system is an important and stimulating process for producers. The logistics system starts with the supply of raw materials, product design, assembly and distribution to customers. A supply chain can be considered when designing this process. Therefore, modelling and optimizing supply networks related to the different processes of the logistics system and data transactions is a major challenge. On the other hand, developments in the digital environment of logistics systems are integrated with the development of Industry 4.0, including Internet of Things (IoT), big data, cloud computing and information systems. Therefore, this document discusses the development of information systems on different processes of logistics systems in modelling the exchange of data between elements of the supply network. The concepts of big data and cloud computing are taken into account when proposing information flow mechanisms. The result allows a complete exchange of data between the elements of the intelligent logistics system on the Internet platform. The functions and solutions of sales, transport, inventory and sales are presented in the different phases of the proposed logistics system. The need for data flow is created using a database concept for making real-time decisions

Keywords: Battery Storage, Super capacitors, Renewable Resources, Wind Power, Supervisory Controller, Battery Lifetime

I. INTRODUCTION

Researchers recently faced major challenges in the field of technological revolutions. Smart devices and robots, cyber physical systems (CPS), the Internet of Things (IoT), big data, virtual industrialization and smart factories are creating a new future potential for the public. [1,2] The Fourth Industrial Revolution led to the widespread introduction of new devices, processes and technology tools in the stream, but not well integrated [1,3]. With the development of Industry 4.0 and related technologies, logistics systems are smarter and more flexible to deliver real-time data and relevant solutions. Otherwise, coordination between all elements of the logistics system must be such that it can handle such a dynamic environment. Therefore, we strive to integrate the process and categorize factors and functions for each element at all times. In addition, the internet of things, big data and the cloud environment are used to alleviate the challenges of data flow and storage.

The rest of the work is organized as follows. The state of the art is then discussed. Section 3 develops the information for the logistics system. Section 4 presents an integrated template for internet platform and shows the required functionality. We conclude in section 5.

1.2. Industry 4.0 concept

The keyword "Industry 4.0" means a development that has significantly changed traditional industries [4]. A high probability is expected in the logistics sector. In fact, logistics is a relevant application in Industry 4.0 [5]. The integration of CPS and IoT in logistics promises that thanks to real-time tracking of material flows, improved transport and accurate risk management, we can travel, but with some perspectives. In fact, Industry 4.0 with its pure perspective can only become a reality if logistics can supply the production systems with the necessary input factors at the right time, with the right quality and in the right place.

At the same time, industrial companies are facing new challenges in increasing product identification, resource efficiency and shortening time to market. These problems are all the greater as digitization, IT integration and the production of networks of products, resources and production processes increase. Terms are often categorized as "Industry 4.0" [6].

According to the services sector, the dominant logic, which focuses on adapting traditional technical approaches to the services sector, is leading to the emergence of a formal approach to service technology [7]. In this term, some authors refer to it as the "service" process [8,9].

Virtual Production (VM) introduced the concept of simulating the production process using a special processing environment, but the production plan was still linked to the product, which was added to the business model [10]. Recent models from the Internet industry (Industry 4.0) may ultimately represent the integration of business processes and production and fully express the concept of product / service based on physical-cybernetic production systems [2,11].

1.3. IoT Applications:

IoT offers new performance opportunities. For example. Road transport trucks can be controlled from a host profile, allowing them to drive at standard speeds at pre-set intervals to increase fuel consumption. The Daimler Group has invested in mobile services such as car2go, my Taxi or moovel; General Electric has also invested in system and equipment start-up, and factories have used the "industrial design" system (the Internet industry).

With IoT, you have access to packaging and letters during the travel process. Constant monitoring and control of the question "Where's the package?" He offers. In case of delay, the customer can be informed of the results and the results before they receive them.

When stored in storage, smart shelves and smart pallets will be the driving force behind modern financial management. When it comes to shipping goods, tracking and tracing is faster, more accurate, more predictable and safer. The analysis of the development of a "connected fleet" makes it possible to predict failures and automatically plan flows to improve the supply chain.

Big Data also has a potential value that has not yet been discovered. However, it has been noted that "all manufacturers have huge data that has never been used." They literally drown in it and when they start collecting, separating, analyzing and reporting business results, they are amazed at how they leave it. "[13] Many researchers have worked on the use of big data. Chen et al. Developing the concept of big data in business intelligence [14]. Dubai et al. The sustainability of production has been investigated with big data [15]] Song et al Performance evaluation in a big data environment has been studied [16] Wamba and Akter [17] Literature analyzed in competition for big data Chain management. Wang et al. Logistics research and the big data system have been investigated [18]. Overall, the researchers tried to test the different dimensions of big data and gain potential benefits for supply chain management (SCM). It is important to understand the role of big data in increasing network efficiency and profitability for supply chain managers.

II. Overview of Information flow from logistics systems

The delivery network design is a related decision-making process that aims to determine the appropriate configuration and effective management strategies for these systems. To support the operation of the logistics system and the structure and organization in the hierarchy, as well as the ability to balance and plan, various aspects of this process such as food, equipment selection, ergonomic risk and learning success.For the general logistics system, the internet can comprise different levels, e.g. B. Supplier, manufacturer, dealer, retailer and consumer. The provision of information between two levels of the logistics system influences decision-making.

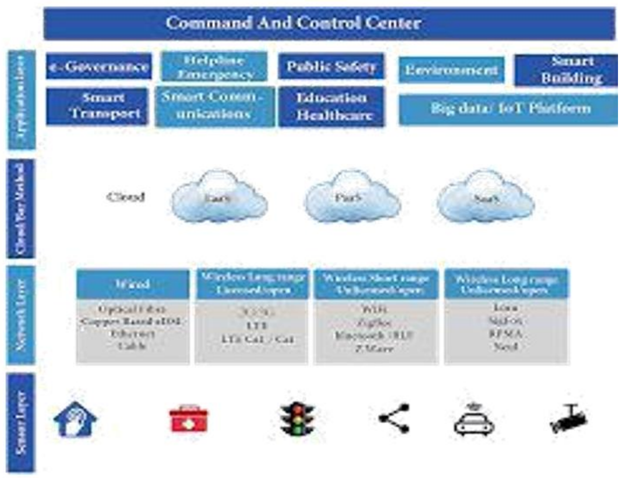

Fig1: Overview of IoT Systems

Solutions are important to improve performance and increase productivity. An overview of the logistics system is shown in Figure 1.

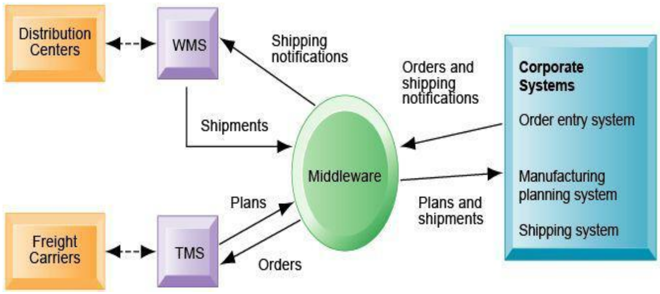

Fig 2: IoT Architecture

Figure 1,2 shows the information flow in a logistics system that contains parts of a conventional logistics unit. First of all, we have an airplane, which means that for every action we have to make a plan to optimize our logistics phase. Then we have the source, which means suppliers need to identify the materials by reducing the side effects of material costs. This source will also have implications for manufacturers at a later date. In the next step, material costs related to suppliers determine production costs as well as warehouses and distribution centers to get the step, specify storage costs and allocate them to the customers in the purchase phase. As evidenced by the proposed logistics system, we will discuss the 5 main stages, with each stage containing different choices, taking into account different facts. These factors show that there are several partners in each phase, so in the initial phase several companies are active in the material supply. In addition, the exchange of information between all levels of the system is indicated by arrows; This step is the exchange of information at each step and the information that is made available to suppliers at this stage. The step-by-step transfer of information from manufacturers to distribution centers is done in the same way as in the delivery phase and in the customer acquisition phase. The information exchange between the phases will be different. For example, during the manufacturing and delivery phase, information such as type of production, quantity of products and quality dimensions is passed on to the distribution centers.

We discuss transport costs and side effects for all material flows in the logistics system to make the optimal decision efficient. We also know that IoT-based information systems can be used in most processes and responses of this logistics flow. To achieve this, IoT-based information flow systems can be used in most of these logistics flow actions and responses. Most companies in the logistics and transport industry need to stop using the internet facilities. The internet will even improve supply chain facilities. The IoT will help companies increase their security and influence. The main technologies for the implementation of the Internet are the Wi-Fi connection, security sensors and NFC (Near Field Communication) means of communication. One of the concerns is data protection and information security, which can be seen as the major obstacle to the implementation of IoT decisions. The high complexity of these solutions is just as important as the high risk.

III. INTEGRATED IOT BASED LOGISTICS SYSTEM

The intelligent logistics information system for this study is based on the Internet of Things (IoT). In fact, elements of the logistics system are considered as information exchange for operational management and optimization. As you can see in Figure 2, the functions and solution of the logistics system are divided into several points, which are processed by data extracted from the elements. The activity is divided into production, transport, warehousing and distribution, each with different sub-functions. For example, the production consists of machines and devices connected to each other using Wi-Fi technology for data exchange. Production processes are also monitored in an online network system. Decisions are again based on optimization performed using operational data. The main solutions used in the supply chain are production planning, inventory management, vehicle routing, cost analysis and time management. Intelligent communication between control and decision elements leads to effective decisions.

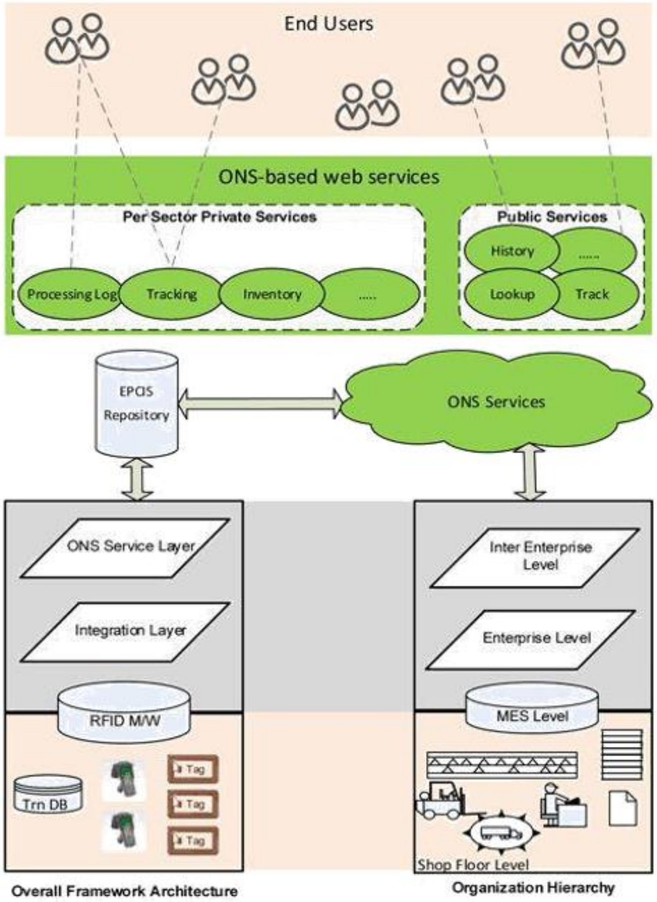

Fig 3 : IoT Integration in Logistics system.

As an advanced integrated system, IoT complements a range of devices with sensor capabilities, detection, processing, communication and network integration. The IoT system includes Industrial Wireless Networks (IWN) and Internet of Things (IoT). This includes automation tools, networks, cloud computing and terminals. The IoT system delivers special and personal products. Users can customize products through websites. Web servers then send data over a wired or wireless network to clouds and industrial facilities. For information, the designer integrates the design and optimizes, manages and manages the production process based on efficiently manufactured products. Using decision-making optimization, machines and equipment are developed to improve performance. As production and delivery are dynamic, the product life cycle is also variable. Through change, decentralization, self-optimization and automation, they can facilitate a dynamic process more efficiently

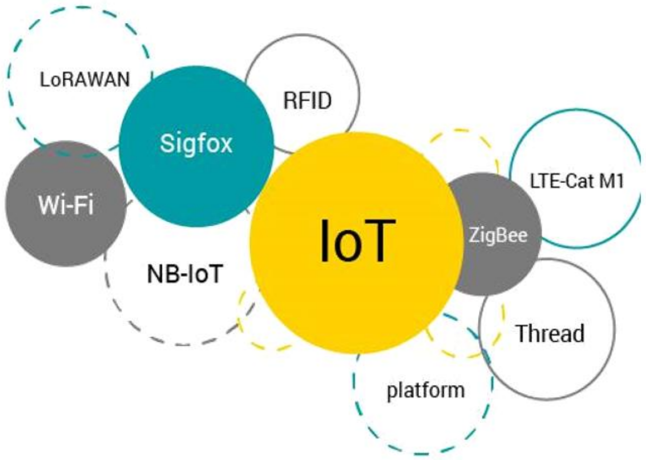

Fig 4 : Various Platforms integration in Iot Logistics System

The technologies shown in figure 4 used in the proposed IoT delivery network include Wi-Fi data exchange in exchange manufacturing, storage with network services and GPS used to determine the vehicle's routing. Figure 4 shows the configuration of distribution network technologies and related features. Configuring SCM can be very difficult if there are several different product cycles. To study the vast amount of knowledge, specific paradigms and concepts need to be considered. Research and models are needed to handle this large amount of data. Under the delivery system are data sources for retail, transportation, invoices and more. Customer profile information, social network profiles, subscriptions, market forecast and geographic plan are important. To analyze delivery system information, retailers can meet their customers' expectations by predicting their behaviour.

IV. CONCLUSION

In this article, we demonstrate that the Fourth Industrial Revolution can be seen as a change in production logic by creating decentralized and self-regulating value, concept and technological capabilities such as CPS, IoT, Big Data, mass computers or additional manufacturing and intelligent factories and factories . . Smart companies best describe themselves to help companies meet their future production needs. It also provides an overview of the results of the fourth industrial revolution in supply chain design and management. In addition, we provide support to companies with the work process in Industry 4.0. This can be achieved by the concept and conditions of the framework describing the different blocks of the sector and the size of 4.0 and can therefore be used as a guide

V. FUTURE WORKS

The following research can be considered: Mathematical models can be developed to make decisions about elements and functions and to use appropriate solutions. Grouping of databases and data mining can be included in a cloudy environment for faster processing. Through the proposed IoT-based integrated logistics system, it is possible to develop an integrated mathematical model with different objectives for the whole solution.

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Cite this article as :

Gutu Ofgaa, Syed Umar, "The Integrated Exchange of Information and IoT for Smart Logistics Systems", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 7 Issue 4, pp. 140-145, July-August 2020. Available at doi : https://doi.org/10.32628/IJSRSET207449
Journal URL : http://ijsrset.com/IJSRSET207449