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INTERNET OF THINGS (IOT) IN LOGISTICS

***Abstract.** This article analyzed the future prospects of IoT devices in logistics. Technologies designed to interact with each other on the same network were considered. The Internet of Things (IoT) represents the next step towards the digitalization of our society and economy, where objects are interconnected through communication networks and exchange information about their status and / or environment.*

***Keywords:** Internet of Things (IoT), software, RFID, wireless.*

The always connected paradigm is one of the features of the IoT. The technology can be very useful in logistics, where each object is uniquely identified and accessible to the network, its position and status are known, and where we have special software services. Modern logistics includes many characteristics such as a systematic industry, a combination of logistics and information technology, technology modernization, supply chain integration, integration services, full service and network architecture of the logistics system. The key technologies for each path are: sensors, smart chips and wireless transmission network. Hence, the core is an identification device, which means the use of some technique via internet protocols to achieve automatic recognition and communication. Currently the most popular device is RFID (radio frequency identification). Over the past decade, RFID has become a useful tool in retail, logistics, healthcare and several other enterprise sectors.

IoT systems require each device to be uniquely numbered with detailed specifications. Using a special system to read or write information, and then send

the data to other systems through a wireless network. The Internet of Things in the physical world is basically a network of digital devices, communications, products and services. Nowadays most systems simply transmit preprogrammed data, but there are devices that transmit data about what they are capable of perceiving, and there are “things” that can autonomously respond to changes in their environment. This higher level of interoperability introduces a new range of consumer touchpoints and opportunities for personalization and hybrid retail shopping. This means that offline retail stores are increasingly moving towards the cloud.

The purpose of the work is to study the possibilities of IoT and identify improvements when integrating them into logistics operations.

Tasks:

1. Analysis of the IoT as a new generation technology
2. Examine the impact of the Internet of Things on modern supply chain management
3. Identify possible improvements after the introduction of IoT in logistics operations

The logistics industry is one of the key players that will benefit from the revolution that IoT technology will bring.

If you imagine those millions of objects being sent, moved, tracked and interacting with various mechanisms, vehicles and people, then it is not surprising that the Internet of Things and logistics are ideally suited to each other. In logistics, the Internet of Things can connect different assets along the supply chain and then analyze the data obtained from these connections to generate new ideas. In doing so, the Internet of Things allows logistics services to achieve higher levels of operational efficiencies by creating customized, dynamic and automated services for their customers. Falling prices for device components (sensors, actuators, and semiconductors), faster wireless networks, and increased data mining capabilities only add to the business benefits, thus ensuring that the Internet of Things heralds a major revolution in the logistics industry. will happen within the next decade [1-5].

But how is the Internet of Things evolving in logistics? Many IoT technologies - including sensors, microprocessors, and wireless communications - have worked

in this field for many years. In fact, logistics became one of the first adherents of such technologies - from the introduction of portable scanners that digitized the delivery process to a system of sensors that monitored the integrity of goods and delivery performance. But early operations are just the tip of the iceberg of the potential of the IoT in logistics.

Inbound logistics for receiving goods can be easily handled using IoT technology. The internal engine focuses on changing the processing order. Inputs are changes requested from customers on existing orders, including pull, push, and cancel.

After all, if all purchase orders are confirmed with sufficient stock, another important warehouse management activity is order picking. Data collection is more complex and difficult than acceptance processes, and the proposed system, integrated with fuzzy logic techniques, offers the most appropriate way to select orders to improve work efficiency. One of the advantages of the fuzzy logic model over other approaches is that it is easier for the end user to understand through its linguistic fuzzy terms, fuzzy meanings and logical thinking process [2].

When warehouse operators receive goods from the production department, information about goods such as SKU number, purchase order number, customer data, quantity and location is captured using IoT technology in the data collection module. Such information is taken into account to create the best way to select an order. This module for selecting orders uses a fuzzy logic mechanism. This module applies fuzzy logic theory to evaluate the most appropriate order selection method to improve the efficiency of the order selection process [3]. Fuzzy is the first step in a fuzzy logic engine. After the data is collected using RFID, the input data is fuzzy and the characteristic is mainly determined by the membership function.

An analysis was carried out on the introduction of IoT technology in warehouse operations in Kazakhstan.

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