ТЕНДЕНЦИИ РАЗВИТИЯ ЦИФРОВИЗАЦИИ В ЛОГИСТИКЕ
TRENDS IN THE DEVELOPMENT OF DIGITALIZATION IN LOGISTICS

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Аннотация. В статье рассмотрены тенденции цифровизации цепей поставок.
Abstract. The article discusses the trends of digitalization of supply chains.
Ключевые слова: логистика, цепь поставок, цифровизация, искусственный интеллект, блокчейн
Key words: logistics, supply chain, digitalization, artificial intelligence, blockchain

Introduction.

Nowadays, supply chain management is one of the most important functions of a company's strategic management. In this regard, more and more enterprises are turning to digital management technologies in order to rebuild their logistics chains in accordance with changing market requirements [1].

The main part.

Today, the transport sector has grown to a level where artificial intelligence (AI) algorithms reduce logistics costs, drones open up new passenger transportation opportunities, and smart platforms increase transportation safety.

The research company Prescient & Strategic Intelligence predicts the growth of the AI market in the global transport and logistics industry to 3.5 billion dollars by 2023, and Statista – to 10.3 billion dollars by 2030.

In such conditions, innovative development in transport companies is not just a goal, but a necessary condition for survival in a competitive market. New technologies open up a wide range of directions for the development of industries: improving logistics based on data; creating a safe and regulated transport environment; automatic analysis and forecasting of the technical condition of cars; optimization of supply chains.

One of the most striking examples of the use of AI in the field of logistics is predictive analytics systems. The traditional approach to route planning is based on a limited number of factors that are largely static and do not take into account actual changes (route length and average speed, for example). Using AI, the model can include data on traffic, weather, waiting time, loading and unloading speeds at specific points and at certain suppliers, the influence of specific company personnel and customer on the speed of delivery. Focusing on the data coming in real time, such a model will be able to build the optimal route with much higher accuracy and calculate the ideal delivery time. This means that at the same time reduce costs and delivery times and increase customer satisfaction with quality service.

Another possibility for optimization is the use of data and analytics to predict vehicle maintenance. Automatic collection of machine status data reduces unexpected costs. And information about its actual operation (routes, road condition, type and weight of cargo) is used for timely planning of maintenance, forecasting of component costs and support of a sufficient number of working machines in the fleet.

For example, the use of Internet of Things technologies provides monitoring of the condition of goods during container shipping. Until now it was possible to track the movement of goods by sea only in limited areas: during loading at the port and after delivery of the cargo to the recipient.

One of the most revolutionary applications of artificial intelligence is autonomous cars. For many years, experiments have been conducted in different countries on the use of unmanned vehicles on the streets of the city. However, in the present in most experiments the operation of

unmanned vehicles requires the mandatory presence of an engineer in the cabin, who will be able to take control in case of an unforeseen situation.

Similar projects are being implemented in cargo transportation and bring good economic results. Aurora, Tesla, Waymo and other companies conduct their developments in the field of autonomous cargo transportation.

Infrastructure transformation affects not only road transport. A large number of Internet of Things sensors are being implemented in Rotterdam to autonomously control the movement of the integrated port infrastructure, which collect a lot of data on all indicators of the functioning of the port and the environment (salinity, tide height, temperature, currents, vehicle movement and container movement).

The high interest of transport sector companies in digital solutions and intensive development require not only the use of ready-made solutions, but also a constant search for new ideas. One of the options for testing ideas in Russia is hackathons. Solutions were developed to reduce injuries in transport from passengers being squeezed by doors or falling on rails. The solutions of the hackathon participants use data from stereo pairs (depth cameras) and Time-of-flight cameras (video cameras for long-range images). However, decision scenarios exclude the human factor. Automated systems independently decide on the possibility of safe departure of electric trains and other types of transport [2].

Another interesting area of digital logistics is blockchain. Blockchain is a continuous sequential chain of blocks containing information built according to certain rules. Blockchain can be defined as a massive database distributed across thousands of different devices. Each of these devices has an exact copy of all the information that is uploaded to the system, and a record of each operation. This results in an interconnected, decentralized and collaborative information network. At the same time, after the data has been recorded in the chain, it can't be changed or canceled [3].

So how is the cargo delivered using blockchain? The shipper uploads the documents necessary for the passage of the cargo into a special online storage, and a pointer to the data storage location appears in the blockchain. With the help of special software, operations with the product are recorded at each stage of its passage. For example, a warehouse employee confirms the fact of cargo delivery using a signature, which is a unique code. He can do this even from his

smartphone in a special application. All participants have a private key that allows them to identify shippers and consignees. This is also an encrypted code. Thus, using the blockchain, the parties exclude fraudulent transactions [4].

Advantages of blockchain in the field of logistics:

– efficiency. The need to involve participants and a huge number of documents can be replaced by an automated process that allows using a structured approach to monitoring the life cycle of a product from its origin to the store shelf and facilitates all ownership changes between manufacturers, retailers and buyers.

– security. Compared to other competitive solutions, blockchain increases the degree of security, since a third party can't change the information stored in the chain. Moreover, blockchain networks can use cryptographic security methods so that a hacker can't practically change the data chain.

– transparency. Blockchain allows companies to track changes effectively and record them: what was changed, why, who made the changes and when. Since all objects in the chain have the same registry version, there is no disagreement about transactions in the chain.

– real-time asset tracking and inventory management. Blockchain can be combined with the Internet of Things and mobile technologies to develop real-time delivery monitoring systems. Tracking no longer needs to be done manually – instead, it can be done using digital sensors that track goods throughout the supply chain from start to finish.

– smart contracts. A smart contract is a blockchain-based solution that allows you to automate the legal binding of agreements in the supply chain.

– performance history monitoring. Blockchain allows you to track the history of the carrier and suppliers. Moreover, companies can check the performance of individual vehicles in the fleet and record the past indicators of specific carriers [5].

Conclusion.

The logistics industry is huge and complex. Controlling the distribution of goods at different levels can be extremely difficult because the supply chain can go through many stages and geographical locations. In addition, this sector includes many documents and invoices. Therefore, logistics companies are constantly looking for new technologies that will help them organize existing processes, reduce

costs and increase the transparency of the supply chain. Blockchain technology can completely change logistics. In combination with new technologies such as the Internet of Things, artificial intelligence and others, blockchain can simplify logistics processes and make supply chains more efficient.

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