

Distributed ledger technology in transport flow management

Distributed ledger technology or blockchain technology is one of the modern and effective ways to solve problems of transport flow management. These technologies also allow to avoid logistical problems related to costs, time, confidentiality and reliability of delivery.

Excessive congestion and increasing quantity of transport vehicles are becoming a significant problem in transport systems and lead to additional losses of time and money, as well as infrastructure congestion, vehicle downtime and consumer dissatisfaction. This requires new approaches to traffic management for their effective operation.

Today, one of the important and promising areas for the information and communication technologies development are blockchain-based technologies. Blockchain is a multifunctional and multilevel decentralized database that contains information about transaction operations, verified and approved by all participants of a secure computer system and consists of algorithms that combine the ordered information of data blocks into one system [1]. The second name of blockchain technologies are distributed ledger technology (DLT). DLT as the superordinate technology to blockchain technology, is associated with the potential to enhance transparency, trust and to enable disintermediation. DLT is a technological protocol that allows data exchange directly between different contracting parties within the network without the need for intermediaries [2] and which has the following advantages (Fig. 1).

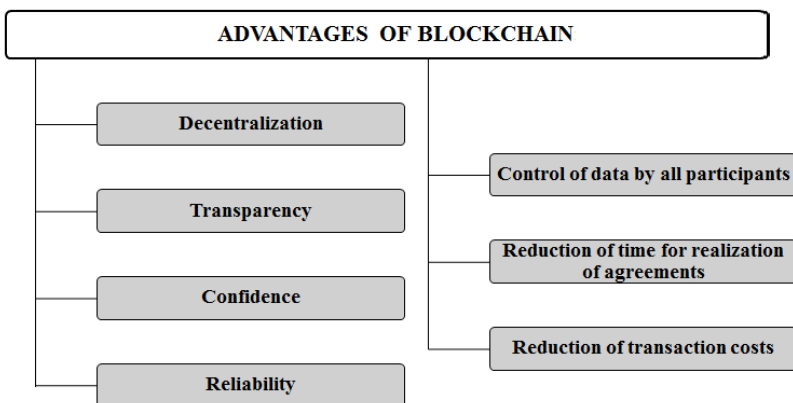


Fig. 1. Advantages of blockchain technology

The blockchain technology is based on logistics business process monitoring systems [3], such as S&OP, FP&S, SRM, CRM, TMS, and WMS (Fig. 2).

The main indicators of the monitoring process are distance of cargo transportation, cost of delivery, number of unfulfilled applications, weight of delivered goods, inventory turnover rate, the number of violations of the terms of delivery, etc.

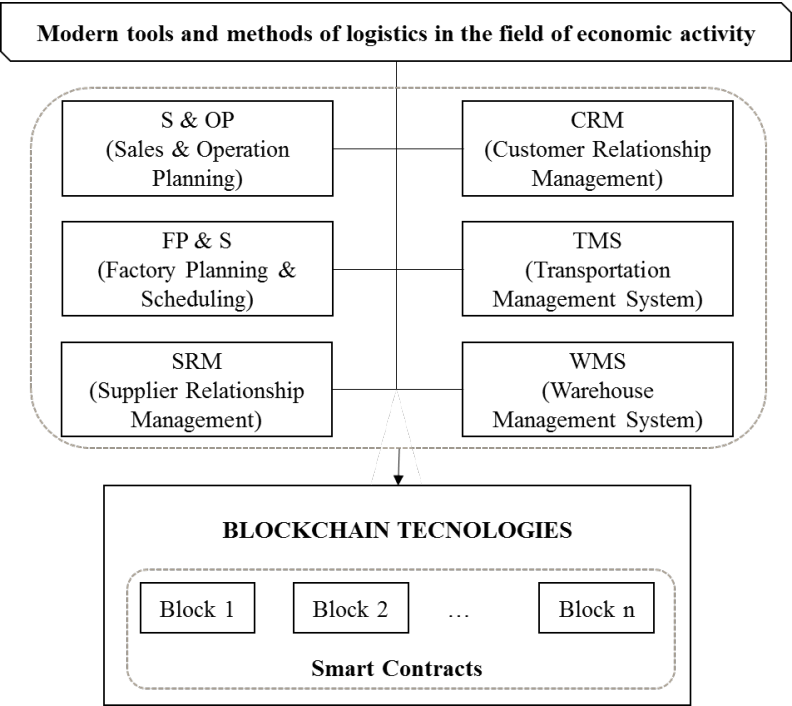


Fig. 2. Modern tools and methods of logistics

Blockchain-based systems can increase the efficiency of the operation and transport flow management; the introduction of blockchain technology in supply chains will track product promotion from manufacturer to customer and establish contacts between all participants in the logistics chain. Moreover, supply chain transactions between firms are subject to radical changes, potentially altering the transaction cost economics of supply chains. In addition, this technology provides transparency in the food market: for consumers – transparency of product history, for wholesalers and retailers provides online access to data on shelf life, transportation and quality, and suppliers can confirm the origin of products [4].

Today there are various programs and blockchain startups for the development of logistics chains in transport flows (Table 1).

Table 1

Logistics blockchain startups (based on sources)		
Project	Description	Advantages and opportunities
Ship Chain	A logistical blockchain startup backed by Roger Crook, former CEO of DHL Kevin Harrington, Steve Schoch, John Monarch, Joel Comm and Brian Evans	– focus on freight; – allows you to track the product at all stages of its movement along the supply chain
Prome TRAIN	The program "smart trains" involves the formation of the Internet of Things and blockchain supply chains. The whole way of cargo delivery and its processes accompanying is sewn into the system, and RFID-tags are applied to the cargoes themselves.	– constant control of the location of goods; – avoidance of additional costs and actions related to intermediaries; – use of electronic exchange of data and documents; – reducing the time spent on paperwork
Startup Yojee	The technology platform, which provides powerful logistics capabilities in supply chain management, it uses artificial intelligence and blockchain technology. The company claims that it already works with thirty thousand vehicles and customers from Singapore, Australia, Cambodia, Indonesia	– possibility to replace the dispatcher; – tracking the status of orders in real time; – formation of accounts; – task management; – fight against fraud and delivery errors; – instant simultaneous updating of information for all participants in the logistics chain

Thus, the use of blockchain technologies allows solving the most complex problems of transport flow management in real time, and also indicates that this area is quite relevant. The use of these technologies provides flexibility of the information system, increases the efficiency of management, organization and control over the transport flow, reduces the time for financial procedures and reduces material costs.

References

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