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The Importance and Specific Aspects of Improving Logistics Transportation Processes Based on Blockchain

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Annotation: This paper explores the critical role of blockchain technology in enhancing logistics and transportation processes. With increasing demand for transparency, security, and efficiency in supply chains, blockchain offers a decentralized solution that enables real-time tracking, tamper-proof records, and automated smart contracts. The study highlights specific aspects such as data immutability, improved traceability, and cost reduction, illustrating how blockchain can address current logistical challenges. Practical applications and case studies are analyzed to demonstrate its transformative impact on logistics systems.

Key words: Blockchain, logistics, transportation, supply chain, traceability, smart contracts, transparency, efficiency, decentralization, data security.

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In the world ranking of innovative technologies and logistics development, developed countries of Western Europe and Asia continue to lead. The global logistics performance index (LPI) is maintained, in which the Federal Republic of Germany is the leader, and its index is 4.45 points out of a maximum of 5 points. The share of the ICT sector in the gross domestic product (GDP) of the leading countries is 9% in South Korea, 5.5% in Japan, and 4.7% in China and India. In the experience of foreign countries, the development of logistics and investment in it is carried out differently in different countries, depending on the economic policy, geographical and demographic situation, urbanization and the level of development of the general infrastructure of certain regions. Today, the organization of many logistics transportation processes on the basis of blockchain is one of the urgent issues. The current global economic system is characterized by the need for constant growth in production in conditions of limited resources. For this reason, it is necessary to review the elements that make up this system and the relations between them in order to increase the efficiency of resource use. This is achieved through the implementation of continuous innovation activities in various structural sectors of the state economy.

In recent years, innovations have become a topical topic for economists, scientists, specialists and economic entities of society as a whole. The number of scientific research, conferences, and articles published in the media aimed at analyzing innovation activity in various sectors of the economy, searching for ways to increase the efficiency of innovations, and optimizing innovation processes is increasing.

This is due to the need to improve the financial condition of enterprises serving national production, prevent a decline in production, and develop an innovation policy that can help the state economy move towards sustainable development. This is due to the large role that innovations play at the macro and micro levels. In essence, they determine the future of society, individual economic entities, and are the drivers of the development of national industrial potential.

B. Twiss considers this process as the introduction of innovations directly into the sphere of consumer needs, as scientific and technical knowledge. In this case, the product becomes only a carrier of technology, and it takes on some specific form when the issue of the interrelationship between technology and the needs to be satisfied is resolved.

Currently, two different points of view are widespread: the first considers the introduced novelty as the result of a creative process in the form of a new product, technique, technology, method, etc.; the second considers it as the introduction of new elements, goods, approaches, principles along with existing ones. In the world economic literature, the term "innovation" is interpreted as the transformation of the potential of scientific and technical progress into a real process expressed in new products and technologies.

In our opinion, all of the above approaches provide a one-sided coverage of this category. "Innovation" is not synonymous with "introduction of novelty", but is a phenomenon associated with the process of introducing innovations in the form of new knowledge, approaches.

Thus, innovation is an activity or result of activity associated with the use of new knowledge, know-how, new combinations of production factors embodied in new technologies, as well as the creation of new products capable of performing new specific tasks with significantly higher market potential, or the elimination of the negative consequences of destructive processes. That is, innovations can be viewed as the result of the transformation of ideas, research, developments, new or improved scientific-technical or socio-economic solutions.

In modern conditions, the competitiveness of the Uzbek economy can be increased only through the introduction of new technologies, goods and services. Therefore, the development of Uzbekistan should occur with an approach to the national scientific and technical potential aimed at the effective introduction of innovations.

The complex nature of innovations, their versatility and variety of areas and methods of application require the development of their classification. Innovations can be classified according to various criteria. In our opinion, the classification based on the analysis of widely used sources in the world experience is appropriate. Table 1 offers a classification of innovations, on the basis of which it is possible to evaluate the results of innovations more accurately, more fully, more objectively, more comprehensively. It also identifies different forms of innovation and allows you to choose management styles for each.

Table 1Classification of innovations [1]

Classification criteria	Classification grouping of innovations
Areas of application of innovations	Management, organizational, social, industrial and transport
Stages of scientific and technical development resulting in innovation	Scientific, technical, technological, design, production, information
Innovation intensity level	Uniform, slow, mass
The rate of introduction of innovations	Fast, slow, fading, growing, uniform, wavy
Scales of innovation	Transcontinental, transnational, regional,

[1] Compiled by the author based on foreign literature.

	large, medium, small or tiny
Productivity of innovations	Top, bottom, bar decision
Efficiency of innovation	Economic, social, ecological, integral

One of the main directions of development of the modern economy is the steady growth of the share of the service sector. The growth of production volumes in economic sectors, the growth of incomes in the service sector, the growth of employment in this sector, the strengthening of competition, the growth of export and import of services are typical for most countries. The rapid development of modern information and communication technologies (ICT) has a significant impact on the dynamic development of international trade in services, their widespread introduction has led to the simplification of access to various services even for consumers located far from the manufacturer.

President Shavkat Mirziyoyev, referring to the development of the logistics system, said: "...it is necessary to ensure more effective use of the transit and logistics potential of the region and the rapid development of transport infrastructure. I would like to note with satisfaction that practical steps have been taken by the countries of the region in this direction. Our Turkmen friends have commissioned the new railway and highway bridges of Turkmenabad - Forob across the Amu Darya. It is an important link in the Uzbekistan - Turkmenistan - Iran - Oman transport and transit route. An agreement has been reached to begin the construction of the Uzbekistan - Kyrgyzstan - China railway in the near future, and a pilot road construction project has also been carried out along this transport corridor. In this regard, we believe that it is necessary to develop and adopt a regional program for the development of transport communications[2]".

According to the proposal of A.M. Gadzhinsky, the structure of the logistics system is divided into three components: preparation logistics, production logistics and distribution logistics (Fig. 1). A.M. Gadzhinsky explains the logistics approach in his research as being related to the need to solve problems in the fields of engineering, technology, economics and mathematics. In his opinion, since the processes of material flow at different stages have sharply different characteristics, specialization in the study and application of functional areas of logistics is desirable.

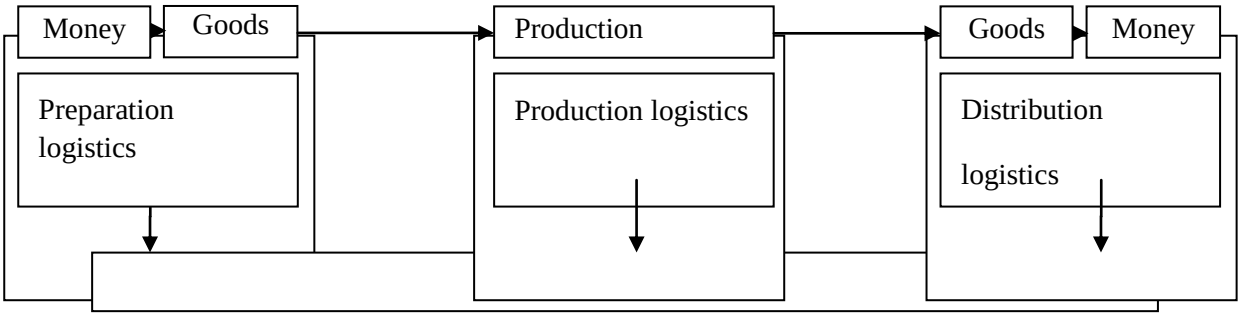

Figure 1.2. Structure of logistics transportation process based on the proposal of A.M. Gadzhinsky[3]

Therefore, the following five functional areas are analyzed separately: preparation logistics, production logistics, distribution logistics, transport logistics and information logistics, as well as the organization of logistics transportation processes based on blockchain.

Blockchain (block chain) is a distributed data set in which data storage devices are not connected to a common server. This data set is stored in a constantly growing list of ordered records, called

[2]Мирзиёев Ш.М. Самарқанд шаҳрида ўтган “Марказий Осиё: ягона тарих ва умумий келажак, барқарор ривожланиш ва тараққиёт йўлидаги ҳамкорлик” мавзусидаги халқаро конференцияда сўзлаган нутқи, 10 ноябрь, 2017 йил.

[3] Неруш Ю.М. Логистика: учеб. для вузов / Ю.М. Неруш // М.: ЮНИТИ-ДАНА, 2000. -389 с.

blocks. Each block has a time stamp and a link to the previous block. The use of encryption ensures that users cannot write to the file without them, and the presence of private keys allows only a certain part of the block chain to be changed. In addition, encryption ensures that all users have copies of the distributed block chain.

Blockchain technology is sometimes called the "Internet of Values," and we think that's a good metaphor. Anyone can post information on the Internet, and then other people can access it from anywhere in the world. Blockchains allow you to send data to anyone in the world, where a blockchain file or some value is publicly available. However, you need a private key generated by a cryptographic algorithm to allow access only to the blocks that you "own." In the case of Bitcoin, keys are used to directly connect to addresses where certain amounts of currency representing financial value are stored. This is how the function of recording the transfer of funds is performed. In addition, another important function is performed - establishing trust relationships and verifying the authenticity of a person, since no one can change the blockchain without the corresponding keys. Changes that are not confirmed by the corresponding keys are rejected. Of course, keys (like physical currency) can theoretically be stolen, but protecting a few lines of computer code usually does not require large costs (compare, for example, the cost of storing the gold reserves at the famous Fort Knox).

Blockchain is a technology that allows system participants to securely transfer assets to each other without intermediaries. For example, records of money transfers can be stored on the blockchain. In cryptocurrencies, the blockchain is used to record information about who transferred virtual money, to whom, and how much. However, other assets can also be stored on the blockchain. In general, everything that can be written on paper can also be written on the blockchain, with the only difference being that records cannot be changed or forged on the blockchain. The weakest link in the existing logistics system in our country is currently the legal support for cargo transportation and logistics activities (score - 2.05 points), which is necessary to organize uninterrupted deliveries. The rating assessed the development of infrastructure in Uzbekistan as very low - 2.36 points. This requires serious research into logistics in Uzbekistan. The annual volume of freight transportation by rail is about 70 million tons, of which more than 35% is export-import and transit cargo.

Uzbekistan Railways JSC pays special attention to export services. In 2020, services worth 369 million US dollars were provided in this regard. In 2020, Uzbekistan Railways JSC transported 70.4 million tons of freight (an increase of 0.6% compared to 2019) and 20.9 million passengers (an increase of 1.5% compared to 2019). In 2020, the total operational length of railways was 5,206.7 km, of which 1,353.5 km were electrified (Figure 1.3)[4].

[4] http://railway.uz. Based on information from the official website of Uzbekistan Railways JSC.

Figure 1.3. Railway length (km.)

Currently, Western European countries and developed Asian countries maintain a firm lead in the development of the logistics sector. However, the logistics systems of developed countries that are leaders in the LPI rating are not the best choice for copying, since each of them, firstly, has its own shortcomings, and secondly, they are designed based on the capabilities of a particular region. Because the development of logistics and investment in it is carried out differently in different countries, depending on the national economic policy, geographical and demographic characteristics, urbanization and the level of development of the general infrastructure of certain regions.

The current position of Uzbekistan in terms of the level of development of logistics requires the implementation of serious projects in this regard. In this regard, recently, positive trends have been observed throughout the country in the construction and reconstruction of roads and the development of regional logistics infrastructure at the expense of regional budgets and the private sector. These measures will serve as systemic elements of the construction of the Uzbek logistics model, which will be formed taking into account the specific features of our country, located on the Great Silk Road[5].

Based on this, the formation of the logistics system of Uzbekistan, which currently does not yet meet high modern standards, can be accelerated not only by applying certain logistics models, but also by using the experience of implementing them in advanced foreign countries. In this regard, one of the most rational ways is to adapt logistics systems that are specific to a particular region and are being effectively operated to local conditions and to master their advantages.

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