



Article

Conceptual Directions for the Development of New Types of Logistics Systems in the Region

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Abstract: In the age of digital economy with new trends of global economic unification and technology evolutions, the logistics and delivery services should undergo transformation as well. The use of these digital technologies provides the digital backbone for logistics systems in the form of ERP, SCM, and GPS tracking. Concatenation of principles of green logistics within current transport and logistics operations and adoption of a modern contemporary management system contemporary management systems such as the Konban model on foundation of "JIT delivery, has shown their potential in enhancing the level of excellence in transport and logistics operations. Regardless of the improvement in the world, Uzbekistan's logistics infrastructure is now far behind in digital transformation and infrastructure upgrading. Although the issues of logistics digitization globally are well covered by foreign researchers, there is little research focused on the adaptation of these systems to the economic, legal and technological conditions of Uzbekistan. The purpose of this study is to investigate the process of digital transformation of logistics systems in Uzbekistan, in the context of the formation of digital management systems in logistics, green logistics, and the modernization of the transport infrastructure in this country. Abstract: Driven by the need to understand the full implications of logistics and digitalization, this study uncovers the main challenges in Uzbekistan's logistics, including shortcomings in digital infrastructure and a limited multimodal transport network. The study also highlights areas for improvement but finds that adopting international good practices and building sustainable logistics frameworks can help. Behnamshahi applied the international models of logistics for the research within a specific country, but the novelty of this study has the form of the very first developed "Digital logistics transformation" strategy for Uzbekistan. The proposed concepts in this study are the making of regional logistics center, the integration of ERP and SCM systems, and the necessity of promoting green logistics to make Uzbekistan logistics services sustainable and effective.

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1. Introduction

In the conditions of modern economic development, logistics and delivery services are becoming a strategic component of the economy. The sharp increase in the requirements of a market economy, the complexity of production and consumption chains require the formation of new approaches to logistics systems. The ability to deliver products and services to the required destination, at the right time and at the lowest cost is recognized as one of the factors of competitiveness today [1].

The transport system, as the heart of the logistics chain, not only ensures the movement of products, but also plays an important role in organizing the integral connection of production and consumption processes. When approached from this perspective, transport services should be planned in complex integration with other elements of the logistics system [2]. In particular, systems organized on the basis of the interaction of various types of transport and mixed transport models serve to increase overall efficiency. The formation of transport and logistics corridors, the development of logistics centers and distribution hubs are integral components of the modern approach [3].

The issue of choosing a mode of transport is solved in connection with the organization and maintenance of the most favorable level of supply reserves, the choice of the type of packaging and wrapping, and other similar issues. When choosing a mode of transport for transporting a particular product, information about the characteristics of various modes of transport serves as the basis [4]. The main conditions for delivery, characteristic of production and consumers of products (customer preference, high level of service, reduced execution time, etc.), depend on the enterprises of the transport network. In the conditions of competition in the transport services market, the difference is that the enterprises of the transport network develop this issue through integrated decision-making. Such a policy includes all decisions and actions aimed at creating a comprehensive transport process [5].

An analysis of freight forwarding companies in the United States showed that the diversification of their activities by transport companies gives good results. This attracts customers, increases profits, accelerates the introduction of new technologies, and strengthens their position in the transport services market. In turn, most manufacturing companies avoid performing many logistics tasks [6].

A study of 350 enterprises operating in various sectors of the US economy revealed that 70% of them have transferred the tasks of registration and implementation of freight billing to transport companies. Approximately 20-22% of enterprises have transferred to transport companies the tasks related to determining freight rates, warehouse operations and determining a convenient route for delivering goods. The practice of transport companies shows that the provision of additional services gives good results. Manufacturing companies that have transferred some of their functions to transport companies are now also paying attention to ensuring the efficiency of their core activities [7].

The policy of a transport company in the field of communication includes the goals of providing information about the services offered to customers and influencing customers to use the services as much as possible. The second goal of this policy is the development and improvement of the use of computer technology in the interaction between transport and freight companies and the development of electronic data exchange [8].

Analysis of the literature on the topic. In recent years, the development of logistics and delivery services in the context of a digital economy has become one of the most relevant scientific and practical areas on a global scale. The transformation of the world economy, the complexity of transport and logistics chains, and the widespread use of digital technologies require increasing the efficiency of logistics systems [9]. Scientific research in this area has developed a number of methodological approaches to digitizing logistics services, automating them, and optimizing information flows.

The works of leading international scientists M. Christophers and D. Waters deeply cover the mechanisms for strategic management of logistics processes, stabilizing supply chains, and ensuring customer-oriented service quality [10]. In particular, their modern logistics models - SCM (Supply Chain Management), ERP (Enterprise Resource Planning), and concepts such as the Total Cost Approach - are now the main components of the logistics policy of many countries. The concept of green logistics is also widely discussed. Chinese and German scientists are paying special attention to developing logistics solutions for environmental safety and reducing the carbon footprint. In this regard, the studies of R. Delfman and L. Kovacs cover methods for forming sustainable supply chains and integrating environmental management systems into logistics [11].

In the context of Uzbekistan, in recent years, a state policy has been formed on the development of logistics infrastructure, the digitization of transport networks and the organization of logistics centers. In this regard, local researchers such as A. Karimov, I. Tadjibayev and D. Oripov have created scientific articles and monographs on the use of digital technologies in logistics systems, automated control systems, and the introduction of "smart logistics" elements. As can be seen from the above analysis, the existing literature on the topic offers a wide range of and comprehensive approaches. However, in the conditions of Uzbekistan, research on adapting these ideas to the local economic, legal and technological infrastructure has not been carried out in sufficient depth. Therefore, this dissertation focuses on combining existing scientific theories and international practice with national experience [12].

2. Materials and Methods

The methodological framework of the study is general systematic profiling because of the complex nature of the issues involved in the formation and development of modern logistics and delivery services in the digital economy. Together with logical analysis, the methodology involved comparison, empirical observation and statistical evaluation to find trends and challenges in transformation of Uzbekistan's logistics. First, the literature and content analysis was performed on the subject of logistics digitalization, green logistics, and local and global studies on supply chain management systems (ERP, SCM). The comparative analysis was then used to study the models of production management that proved successful in the countries of the USA, Germany and China (Kanban, Kaizen and Lean logistics) and to study the possibility of their adaptation in the conditions of Uzbekistan's economy and its technology. The second (empirical part) of the study included analytical research of statistical data, sectoral reports, and government official publications to assess the national logistics infrastructure state and performance. Progression and need appraisal patterns were identified using dynamic and trend analysis methods. Indicators to measure the state of digitalization and sustainability of logistics systems were created with the help of expert assessments. These findings paved the way for synthesizing some realistic recommendations for modernizing logistics infrastructure in Uzbekistan, systems of digital management and green logistics. This layered approach guaranteed theoretical richness at the same time as practical applicability and finally understanding what the future of logistics and delivery services in Uzbekistan is being paved for us by the processes of digital transformation.

3. Results and Discussion

When choosing a mode of transport, criteria such as product characteristics, distance, delivery time, level of security, and total costs play an important role. Although road transport is suitable for short distances and has the ability to provide "door-to-door" services, its use is relatively expensive. Rail transport makes it possible to deliver large volumes of cargo over long distances at low cost. Water transport is the cheapest option, especially important in international freight transport, but the speed of transportation is low and depends on the seasonality factor. Air transport is the fastest mode of transport and has advantages in the delivery of expensive and perishable goods, but its high tariffs and sensitivity to weather conditions limit its potential [13].

In the modernization of logistics systems based on the requirements of the time, the Konban (Just-in-Time) model, based on the principle of "delivery in a specific time", is recognized as one of the important conceptual directions. This approach serves to ensure the stability of production, reduce warehouse costs and increase the speed of resource turnover. In this model, goods are delivered at a specific time, based on a strict schedule, which ensures the consistency of each link in the logistics chain. In particular, the use of this system in the automobile assembly industry has significantly increased production efficiency. For example, the delivery of components on the Nissan automobile assembly line based on the need for only two hours indicates the successful implementation of this system.

Another important direction of modern logistics systems is the improvement of management systems based on digital technologies. The introduction of information and communication technologies creates opportunities for real-time monitoring of cargo movements, optimization of vehicle movements, automation of loading and unloading processes, use of forecasting algorithms, integration of the entire logistics chain using ERP and SCM systems. This ensures transparency, speed and reliability of the entire supply system [14].

Modernization of local logistics infrastructure, especially in increasing the capacity of transport and logistics services, plays a special role. In the territory of the Republic of Uzbekistan, the electrification and renewal of railway lines of the State Company "Uzbekistan Railways", improvement of the infrastructure of international airports, restoration of inland water transport, liberalization of road transport processes are significantly increasing the capacity of logistics services. In particular, the development of the Termez river port, international airports, and "door-to-door" services in road transport are creating an important basis for the comprehensive modernization of the country's logistics system. In addition, the formation of a sustainable and environmentally friendly logistics model within the framework of new conceptual approaches is also one of the pressing issues. The use of environmentally friendly vehicles, waste reduction, the use of recyclable packaging materials, and the development of optimal cargo transportation routes based on the principles of green logistics serve to ensure environmental sustainability. This ensures the stable operation of logistics systems not only economically, but also socially and environmentally [15].

Modernization of logistics and delivery systems, development of their new conceptual directions are an important factor in increasing the economic potential of Uzbekistan, expanding international economic relations and meeting the demands of the domestic market. Approaches based on a precise delivery system, digital technologies, integrated transport-logistics integration, and green logistics have become priority areas of modern logistics policy. Therefore, in the future, consistent reforms and institutional approaches in these areas are required. Transport is a material production sector that transports people and goods. The structure of social production includes the production of material services. The role of transport in social production is shown in Figure 1.

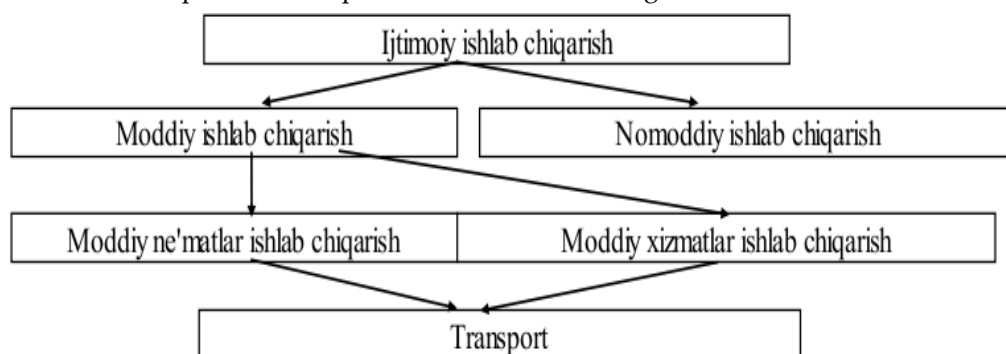


Figure 1. The role of transport in social production

A significant part of the delivery activities of the material flow from the first raw material source to the final consumer is carried out using various means of transport. The costs of these activities account for 50% of the total costs of delivery. Depending on the work performed, transport is divided into two main groups:

1. Public transport is the main branch of the national economy, serving the needs of the population and all sectors of the national economy in the transportation of goods and passengers. This transport also serves the population in the communication road system. It is often called the highway (the main main line in some system, here the system of communication roads). The concept of public transport includes railway transport, water transport (sea and river), road transport, air transport and pipeline transport.
2. Non-public transport - all forms of transport within production and non-transport enterprises. The organization of cargo transportation using non-public types of transport is the subject of

production delivery. The issue of choosing channels for the movement of goods is resolved within the framework of delivery. The subject of transport delivery is a complex of issues related to the organization of transport cargo supply in public service.

The tasks of transport delivery:

- a. organization of transport systems, including transport corridors and transport chains;
- b. planning of various transport units of transport processes (in the case of mixed supply);
- c. ensuring the technological unity of transport - warehouse processes;
- d. planning of the transport process with warehouse and production;
- e. selection of the type of transport vehicle;
- f. free provision of transport vehicles;
- g. determination of the correct marketing of delivery.

The issue of choosing a mode of transport is solved in connection with the organization and maintenance of a favorable level of supply reserves, the choice of packaging and wrapping type, and other similar issues. Information about the characteristics of various modes of transport serves as the basis for choosing a mode of transport for transporting a particular product. We will consider the advantages and disadvantages of road, rail, water, and air transport from the point of view of delivery.

1. **Road transport.** One of the main functions is high speed. With the help of road transport, cargo can be delivered within the required time. This type of transport ensures regularity of delivery. There are fewer requirements for packaging compared to other types. The disadvantages of road transport include the relatively high cost of transportation, that is, the fee is usually charged for the carrying capacity of the vehicle (maximum volume). Other disadvantages of this type of transport include the possibility of unloading and transporting cargo, the possibility of losing cargo and the possibility of damage to the vehicle on the road, and the relatively low carrying capacity.
2. **Rail transport.** This type of transport is well adapted to transporting various sets of cargo in different weather conditions. Rail transport allows for regular transportation and transportation of cargo over long distances. Loading and unloading operations here can be profitable. The advantage of rail transport is the relatively low cost of transporting cargo.
3. **Water transport.** The disadvantages of sea transport include low speed, strict requirements for packaging, wrapping and securing of cargo, and low frequency of shipments. Inland waterway transport. This type of transport is the cheapest for long-distance transportation with low freight rates. The disadvantages of inland waterway transport include low delivery speed.
4. **Air transport.** The main advantages: speed, the ability to deliver to individual regions. The disadvantages include high cargo volumes and weather conditions (weather conditions that reduce the ability to adhere to the delivery schedule).

The main factor influencing the choice of transport type is different, see Table 1.

Table 1. Evaluation of various transport modes by factors influencing the choice of transport mode.

Transport turi	Transport turini tanlashga ta'sir qiluvchi omil					
	Yetkazib berish muddati	Yuk jo'natish chastotasi	Yetkazib berish jadvaliga rioya qilish ishonch- iligi	Turli xil yuklarni tashish qobiliyati	Hududning istalgan nuqtasiga yukni yetkazish qobiliyati	Tashish qiymati
Temir yo'l	3	4	3	2	2	3
Suv	4	5	4	1	4	1
Avtomobil	5	1	1	5	5	2
Quvur	5	1	1	5	5	2
Havo	1	3	5	4	3	5

1. Road transport - It is a type of transport that transports goods and passengers on non-rail roads. They mainly perform the following functions:

- a. Loading and unloading goods onto highway transport (steamboat, airplane, train, etc.).

- b. Transportation of industrial and agricultural goods in a short time.
- c. Transportation of goods for construction and trade.
- d. Transportation of perishable, expensive, and quickly transported goods by road over long distances that are difficult to transport, unload, and load by other types of transport.

Currently, no sector of the economy can fulfill its tasks without road transport. Although the cost of labor and money for road transport is greater than for other types of transport, it is widespread at all stages of the economy. Transportation of goods by road transport is efficient. Especially in the case of "door-to-door" transportation of goods, the costs of loading and unloading goods reduce the time spent on the road.

2. Railway transport - The railway transport in the national economy plays a significant role in passenger and freight transportation. The republic's railway transport occupies an important place in the implementation of economic relations with neighboring countries within the CIS. The total length of the national economy in the republic is 6.6 thousand km, including the length of the publicly used part - 25 thousand km, and the length of the railways, mainly used by industrial enterprises, is 3.1 thousand km. In November 1994, the State Joint-Stock Company "Uzbekistan Railways" was established on the basis of railway enterprises and divisions, design and construction and other organizations and institutions located in the Republic of Uzbekistan. The Republic of Uzbekistan is participating in the construction of the "Trans-Asia" highway (Istanbul - Tashkent - Almaty - Beijing), which is of great importance for the independence and economy of the country, connecting it with China, Korea, Japan, Iran, Turkey and the south of Western Europe.

Uzbekistan Railways has more than 50 thousand various freight cars and refrigerators made in Germany, 1450 passenger cars. The company has Tashkent, Fergana, Bukhara, Aral Sea, Karshi departments responsible for the use of the railway. 46.2 million tons of cargo were transported by general-purpose railway transport. Cargo transportation in 20-ton containers was carried out at 11 stations in the republic. In order to create a unified railway network of Uzbekistan, the reconstruction and electrification of the railway line on the Navoi-Nukus route has begun. The construction of a new electrified Urgench-Beruni railway is of great importance for the socio-economic development of these regions. Train traffic management in the republic is carried out in Tashkent, where there is a single dispatch center. A high-power information computing center is operating, which provides automated services in train traffic management systems.

The maximum speed of passenger trains is 100 km/h, freight trains are 80 km/h, passenger trains on inter-station routes run at a speed of 60 km/h, freight trains are 35 km/h. The locomotive fleet of the Uzbek Railways company consists of new types of diesel locomotives, electric locomotives, and electric trains. Passenger and freight wagons are repaired, and iron-concrete sleepers are manufactured. Repair of Tashkent, Khovos, Kokand, and Andijan locomotives has been mastered. The head enterprise of the Uztemiryolta'mirzal production association carries out factory repairs of Tashkent diesel locomotives and overhauls of passenger wagons, and the Pakhtaabad plant repairs closed wagons, platforms, and semi-trailers.

3. Air transport. Uzbekistan is connected by air with the capitals of many countries of the world, large cities and industrial centers. After the republic gained independence, the national airline "Uzbekistan Airways" was established in January on the basis of the Civil Aviation Administration of Uzbekistan, 243 civil aviation repair plants, and "Aviamaxsusmontajszolik" affiliated with the "Aviaqurilish" association, which were under the jurisdiction of the former Union. The country's own transport plays an important role in establishing foreign economic and tourist relations of the republic, especially with foreign countries. The national airline "Uzbekistan Airways" purchased Airbus A-310-300 airbuses from the large European concern "Airbus Industry" began to serve passengers on international routes. The national airline "Uzbekistan Airways" has the following aircraft: AN-2 for agricultural work, AN-24, YAK-40 for national flights, IL-86, TU-154, A-310, V-767 international class aircraft, and MI-2, MI-8, KA-26 helicopters. The regional center has airports capable of receiving TU-154, Samarkand, Namangan, Urgench, Termez airports IL-62, IL-72, Nukus airport IL-86, A-310 airbuses. Tashkent,

Samarkand, Termez airports have international status. According to the decision of the republican government, preparations have begun for the construction of a large new airport in Uchkuduk that will meet the most advanced world standards. Pilots, technical service personnel, and ground service personnel for the republican air transport will be trained at the flight training and technical center of the national airline and at the Tashkent Aviation Institute.

4. Water transport. Water transport is the transport of goods or passengers by water. Transportation is carried out by natural (river, sea, lakes, oceans) and artificial (canal, reservoirs, etc.).

Water transport is divided into 2:

1. By sea
2. By inland waters.

River transport. It is a type of transport that transports goods and passengers mainly by inland waterways. River transport is divided into:

1. Serving the implementation of foreign trade between major river routes or international countries. Danube, Oder, Rhine, Amur.
2. Interregional. Large interregional transportation within the state Volga, Mississippi, Amu Darya.
3. Carrying out local, that is, interregional cargo transportation.

River transport, despite its seasonal nature in several countries, is much more efficient than other types of transport. For example, the initial costs of organizing shipping on large rivers are 8-10 times cheaper than the costs of organizing a railway. Freight transportation on major rivers is 55% cheaper than rail transport and 3-5 times cheaper than road transport.

A department for coordinating the work of the river fleet has been established under the Uzavtotrans Corporation. The republic has the Termez river port, the ports of Shorlovuk, Tortkul, Beruniy, Karatog, Khojaly, the Tortkul-Khonka, Chalish-Beruniy floating bridges across the Amu Darya, and the Khojaly ship repair plant. The Termez port has a cargo reception and dispatch capacity of 2.5 million tons. There are international, as well as exchanges, dredgers, floating port cranes and other auxiliary vessels and technical means for the delivery of export and import cargo through the port of KHairaton in Afghanistan. The total length of the republic's waterways is about 1,000 km. National economy cargo is transported mainly on the routes Termez-Khayraton, Shorlovuq-Tortkul, Khojaly-Tortkul, Khojaly-Beruni, Karatog-Taxiatash. In 1999, 132.7 thousand tons of cargo were transported by the river fleet. The ports and harbors of Uzbekistan are connected by railways. Specialists for the river fleet are trained at the Chorjoy River Technical School and the Odessa Institute of Fleet Engineers.

The development of delivery has had a significant impact on transport policy. Ensuring the synchronization of production and transport operations in the economic activities of firms is widely used in Konban (just-in-time) systems. The essence of its application in transport is that if the main production uses technology according to a strict schedule, that is, information about the volume of stocks of available materials, raw materials, semi-finished products and components, then delivery organizations are carried out, respectively, at short intervals (Konban system) and at a strictly defined time (just-in-time). According to this technology, the volume and delivery of cargoes are at a specific time. For example, a car from the main conveyor of a car assembly plant does not go into a warehouse, but into a wagon, and at the same time, a loading device controlled by ICT puts the next wagon in order to load the next batch of cars. This technology allows you to work without expensive warehouse management and accelerates capital turnover. As a result, the standard of material reserves is reduced. For example, in Japan, they are needed for 2 and 5 days, while the transition to a system where the stock of components at the (Nissan) car assembly plant is designed for only 2 hours (for a specific period) reduces the time required for the sale of goods by 2 times. Since the 70s and 80s, transportation and production services have organically merged, turning into a single production transport and distribution system. A new approach to transport as a large system, that is, as part of the logistics chain, has led to the need to allocate it to various sectors. In this case, transport

is considered in the material technical supply system from the manufacturer to the final consumer.

The liberalization of road transport and the fixed-term system have led to an expansion of its scope. While road transport is usually used for short and medium distances, in the USA it is used for the transportation of components and finished products over distances of up to 1,600 km. In Western European countries, the share of road transport has increased not only domestically, but also internationally. In the fixed-term system, rail transport is not very favorable compared to road transport. By the end of the 1980s, 49% of manufacturing firms operating in this delivery system in the USA reduced the level of use of rail services. Several firms maintained their level of service, and only 2% of firms increased their use. However, this does not mean that the use of rail transport should decrease in the new system. The speed of movement of containers and trains by rail transport is very advantageous. In order to speed up the delivery of goods by rail, it is possible to expand the supply of containers.

The use of inland waterway transport in the logistics chain is somewhat limited by its responsibility in most countries. However, inland waterways are used as an alternative to road transport. As a result of the use of a fixed-term system, the use of water transport has expanded when it is necessary to increase the speed of cargo delivery.

The fluctuation of the logistics concept in the practice of the world economy has to some extent led to an increase in the volume of intercontinental cargo transportation by sea and air transport. Cargo transportation by air is also increasing in domestic communications. For example, the demand for air transport in the activities of firms operating on a fixed-term system has increased by 29%, while only 5% of firms have not implemented its services.

The logistics system operating on the "strict schedule" system has achieved high efficiency in the sale and supply of goods and materials, as it has developed a new type of service that is engaged in the collection and distribution of cargo. As a result, less money is spent on the operations performed and a higher quality of service is provided. When delivering products, it is mainly understood that autotrans operate along the route. When delivering products by road transport, it is mainly intended to organize low delivery costs and reduce labor productivity of automobile traffic.

Delivery of products by road transport is carried out in the following 2 ways:

1. by swing method;
2. by ring method.

The pendulum method mainly connects 2 cargo transportation points, and this process is repeated. In the ring method, several manufacturers and consumers are connected by a car.

4. Conclusion

This paper provides the findings of the study that explains the digitalization of Uzbek logistics and delivery services that is important step for national economic modernization and competitiveness. Although there are great many of advancements in the integration of ERP SCM and green logistics systems globally; but logistics in Uzbekistan is facing fragmented information systems, poor multimodal transport connectivity and insufficient digital development. On the other hand, the adoption of international best practices — like Kanban and Lean (logistics models) — presents considerable scope for improving operational efficiencies, cutting costs, and supporting the environment. It emphasises that facilitation of digital management tools & regional logistics centres in operational functions for supply chain integration, can help further advance sustainable economic growth. These results suggest the need for policymakers to come up with a national strategy for something akin to a "Digital Logistics Transformation," with particular emphasis on digital governance, investments in infrastructure, and the development of human capital. In addition, the engagement of the private sector and global collaboration is needed to speed up both innovation and technology adoption. Future studies may estimate of levels of digital maturity across logistics firms in Uzbekistan, impact analysis

of digital logistics on regional development, artificial intelligence and blockchain technologies for supply chain transparency and performance.

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