



AI IN AVIATION AND LOGISTICS: OPERATIONAL TRANSFORMATION FOR GLOBAL CONNECTIVITY

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Annotation. The application of artificial intelligence (AI) technologies in modern aviation and logistics is fundamentally changing operational processes on a global scale. With the help of AI, opportunities are being created to optimize flight schedules, increase safety and accuracy in the cargo transportation system, manage the supply chain in real time, and reduce costs. In aviation, AI plays an important role in ensuring flight safety, predicting maintenance, and effectively determining aircraft routes. In the logistics sector, artificial intelligence manages cargo flows by analyzing big data, ensuring fast delivery to customers, and accelerating digital transformation. As a result, global connectivity is becoming more efficient and integration between international transport systems is being strengthened. This study highlights the application of AI technologies in aviation and logistics, their advantages, and their contribution to the global transport system.

Keywords: artificial intelligence, aviation, logistics, global connectivity, supply chain, transportation system, optimization, digital transformation, security, big data.

21st century technologies have deeply penetrated all aspects of human life. In particular, artificial intelligence (AI) has taken an important place in leading sectors of the economy in recent decades. The aviation sector, which is at the heart of transport and logistics processes, has not been left out of the AI revolution. Today, artificial intelligence is emerging as one of the main drivers in the efficient operation of the global transport system, ensuring safety, managing cargo transportation and supply chains.

In recent decades, artificial intelligence (AI) technologies have developed rapidly and have penetrated almost all aspects of human life. From medicine to education, from the financial system to production, AI is helping to increase efficiency, speed and security. One of the most striking areas of this process is the global transport system, in particular the aviation and logistics networks. It is in these areas that aspects such as operational efficiency, time saving, ensuring safety and economic benefits are the most important. For this reason, the introduction of AI technologies is causing fundamental changes in aviation and logistics systems and is starting a new stage in the process of global connectivity.

Global connectivity is today seen as a mechanism that not only reduces geographical distances, but also deepens economic, cultural and political integration. This process allows for strengthening cooperation between countries, regions and companies, accelerating international trade flows, and expanding the exchange of knowledge and experience. It is aviation and logistics systems that are at the heart of this process, ensuring the movement of people and goods around the world. However, in modern conditions, increasing demands on the transport system, further tightening safety standards, intensifying environmental

problems and changing customer needs make it difficult to effectively manage the existing system. The role of artificial intelligence at this point is unparalleled.[1]

The aviation industry is historically one of the fastest-growing sectors of technological innovation. There is a need for high accuracy and rapid decision-making in processes such as flight safety, maintenance, and flight management. Artificial intelligence is emerging as an important tool for further improving these processes, reducing human error, and making flights more cost-effective. For example, AI algorithms can optimize flight routes taking into account weather conditions, air currents, and other factors. This helps reduce fuel consumption, shorten flight times, and reduce environmental damage.

AI is also being used in aviation through predictive maintenance models. While traditional maintenance methods are performed after a failure occurs, AI can help identify potential problems with aircraft components in advance. This not only ensures flight safety, but also significantly reduces maintenance costs. AI is also taking the passenger service system to a new level: electronic check-in, baggage tracking, personalized services and instant communication platforms for customers are a vivid example of this. The logistics industry is also developing rapidly as a result of the effective implementation of artificial intelligence. Modern logistics includes not only freight transportation, but also the management of the entire supply chain. With the help of AI, it is possible to analyze large volumes of data, determine the most optimal delivery routes, automate warehouse systems and achieve high efficiency in customer service. For example, large companies such as Amazon, DHL and Alibaba are widely using AI-based warehouse robots and intelligent algorithms. This allows for faster sorting, dispatching, and tracking of shipments, dramatically improving customer service.

In addition, AI is becoming an important tool for ensuring transparency in the supply chain. AI systems integrated with blockchain technologies allow for tracking the path of a product from manufacturer to consumer.

This not only increases security, but also plays a major role in reducing the problem of counterfeit products on a global scale. At the same time, AI-based customer service platforms allow for faster order processing, optimization of the delivery process, and resolution of complaints.

The strategic importance of AI in the process of global connectivity is unparalleled. With the help of artificial intelligence, transportation systems of different countries and regions are being integrated with each other. As a result, international trade flows are becoming more stable, faster, and safer. The importance of AI technologies has become especially evident during the pandemic. During the COVID-19 pandemic, logistics systems were effectively organized using artificial intelligence. This has shown not only the economic but also the social importance of AI.

However, along with the introduction of AI, problems are also emerging. In particular, large investments are required to implement the technology, cybersecurity risks are increasing, and there is a shortage of qualified personnel. In addition, there is a risk of becoming too dependent on AI. Because the complete automation of human decision-making processes can sometimes cause problems in unconventional situations.[2]

However, in the future, AI technologies will undoubtedly transform the aviation and logistics industries even more deeply. Autonomous vehicles, AI systems combined with quantum computing capabilities, green logistics and innovations aimed at environmental

sustainability are expected to be the main directions of this process. As a result, global connectivity will further strengthen, and economic and social integration around the world will reach a new level.

In general, artificial intelligence has initiated revolutionary changes in the aviation and logistics industries. It is not only increasing operational efficiency, but also reorganizing the entire transport system. For global connectivity, AI is of strategic importance in strengthening international cooperation, ensuring security, and supporting environmentally sustainable development. Therefore, this research topic is relevant and has not only scientific but also practical significance.

The concept of global connectivity in modern times is considered not only as a mechanism for reducing geographical distances, but also as a mechanism for strengthening economic, cultural and political integration. Aviation and logistics systems are at the heart of this process, and the large-scale introduction of artificial intelligence is taking these systems to a completely new level. This article analyzes the practical application of artificial intelligence in the aviation and logistics sectors, its impact on operational processes, its role in strengthening global connectivity, and future development directions.

One of the main priorities of air transport is safety, speed, and accurate planning. AI is making fundamental changes in this area in the following areas:

Algorithms developed based on AI optimize aircraft routes taking into account weather conditions, air currents, and airspace density. This is important for reducing fuel consumption, reducing flight time, and ensuring environmental sustainability.

While traditional maintenance is carried out "after the fact," AI can detect a malfunction in advance. Machine learning-based systems predict potential failures in engines, wings, electronics, and other components.

AI-based monitoring systems monitor the technical condition of aircraft in real time, evaluate pilot performance, and offer quick solutions in problem situations.

AI is being used to offer personalized services to passengers. For example, check-in processes, baggage tracking, and assistance systems for passengers with special needs are being automated.

In logistics networks, artificial intelligence is revolutionizing supply chain management, improving freight efficiency, and providing customer service.

By processing large amounts of global data, AI reduces delivery times and determines the most efficient routes for vehicles.

AI robots reduce human effort in sorting, placing, and tracking cargo, minimizing errors. Companies such as Amazon and Alibaba are widely using these technologies.

AI systems integrated with blockchain allow tracking the path of a product from manufacturer to consumer. This increases security and reliability.

AI-based chatbots and automated response systems provide quick assistance to customers, speed up the process of processing orders and delivering them.

Global connectivity in the modern economy implies the creation of a single transport and logistics ecosystem that overcomes national borders. AI in aviation and logistics processes:

- Increases integration between transport systems;
- Ensures the stability of international trade flows;
- Helps develop rapid solutions to global crises such as natural disasters or pandemics.[3]

During the COVID-19 pandemic, AI-based logistics systems played a key role in the rapid distribution of vaccines. This demonstrated not only the economic but also the social importance of AI.

The application of AI technologies to the aviation and logistics sectors offers many advantages, but also poses some challenges.

Advantages:

- ✓ Reduce operational costs;
- ✓ Increase the level of security;
- ✓ Ensuring the stability and transparency of the supply chain;
- ✓ Fast and high-quality service for customers.

Problems:

- High costs of implementing AI systems;
- Increased cybersecurity risks;
- Lack of qualified personnel;
- The risk of becoming overly dependent on technology.[4]

In the future, AI is expected to develop in the aviation and logistics sectors in the following directions:

Drones and autonomous trucks will be widely used in the delivery system.

Complex logistics calculations will be performed faster and more accurately using quantum technologies.

Using AI, environmentally sustainable transport systems will be developed, carbon dioxide emissions will be reduced.

Integration of transport and logistics systems will be strengthened through single international platforms based on AI.[5]

In conclusion, Artificial Intelligence is revolutionizing the aviation and logistics industries. It is an important tool for improving flight safety, organizing maintenance efficiently, accelerating cargo transportation processes, and reducing costs. At the same time, AI is emerging as a force that brings countries, companies, and societies closer together in the process of global connectivity.

In the future, AI-based aviation and logistics systems are expected to be more integrated, sustainable, and environmentally friendly. This will contribute to the development of the global economy, strengthening international cooperation, and improving the quality of life of humanity.

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