

## SAFETY IN THE TRANSPORTATION OF MILITARY CARGO IN MODERN MILITARY LOGISTICS

*Krupyna S., Gordienko A.A, Pichugina M.  
National Aviation University*

**Abstract.** *In an era of constantly evolving security challenges, this research examines the strategies, technologies, and protocols necessary to ensure the safety and efficiency of military cargo transportation. By analyzing contemporary methods and exploring potential consequences of new technologies, the thesis provides valuable insights for military planners and policymakers in security matters, contributing to the enhancement of safety and operational effectiveness in military logistics.*

Considering the aggressive intentions of the Russian Federation and its ongoing temporary occupation of parts of Ukraine, there arises an urgent need to swiftly reorganize and reinforce military forces. The key element in the rapid formation and deployment of these primary military units and subunits lies in their readiness to relocate swiftly without compromising their cohesion. This ensures a smooth transition to executing tasks along the entire route.

In this context, it's crucial to emphasize the dynamic nature of modern military conflicts and the need for flexibility in responding to evolving threats. The ability to rapidly adapt, redeploy, and reinforce troop groups is essential for effective defense and deterrence.

Furthermore, the situation underscores the significance of preparedness and logistics in maintaining national security. Timely and efficient movement of military assets is a critical component of military strategy, and it directly impacts the ability to respond to emerging challenges.

Modern conditions of military conflicts pose complex challenges for military logistics in terms of the safety of transporting and storing military cargo. The increase in threats to cybersecurity, physical security, and the confidentiality of information requires research and the development of strategies and technologies to protect these critical military resources.

To begin with, it is necessary to understand what exactly is considered military cargo.

Military cargo is military property (all types of weapons, combat and other equipment, ammunition, fuel and lubricants, food, and other material and technical means, etc.) assigned to the Armed Forces of Ukraine, other

military formations established in accordance with the laws, law enforcement agencies, and transported by various means of transportation.

Military transportation involves the transportation by railway, maritime, river, air, and road transport of personnel and military cargo, as well as the transportation by inland waterways of ships, vessels, and watercraft of the Armed Forces of Ukraine.

The planning should take into account the following initial data: the number of personnel, the availability of military and civilian vehicles being transported, the availability and characteristics of transport vehicles (military and civilian), priorities set for transportation, time required for planning and transportation, the condition and capabilities of transport communications in transportation modes, critical objects on them, the presence of potential barrier lines, other risks and threats, capabilities in strategic transportation, capabilities in port reception and handling for landing and disembarking, requirements for the protection and escort of military cargo, the degree of protection of transport communications (the nature of the enemy's impact on transport objects and the possibility of using various means of attack), the choice of the mode of transportation depending on the most economical resources for timely transportation, taking into account the specified time parameters, the nature of the terrain in operational areas (regions), climatic, seasonal, and natural conditions.

The goal of logistics, both in peacetime and during wartime, is to ensure that necessary cargoes are delivered to the required location at the right time. When comparing the classical "7R" rule or the mission of a commercial logistics system to crisis logistics, the following can be noted: in crisis logistics, the priority should be providing assistance to expedite the delivery of necessary cargoes. Minimizing costs in this case is not a priority. It is difficult not to agree that logistics as a science and field of activity has a long military tradition. It is impossible not to agree that one belonging to the key factors of victory is the rapid and timely supply of weapons, ammunition, fuel, medicine, and food to the right place.

After the annexation of Crimea and the beginning of the war between Ukraine and Russia in 2014, military logistics lagged behind the needs of modern technology because it had not been developed for 20 years. Ukraine was also lagging behind its neighboring country, which was at war with us, in terms of logistics, by at least two wars [1].

Ukrainian military logistics significantly lags behind civilian logistics, and its burden has increased during the war imposed by Russia. However, utilizing the potential of civilian logistics has enabled meeting the needs of the Ukrainian military. Ukraine's civilian sector has a large number related to logistics companies that currently provide the defense industry with

modern equipment, qualified personnel, and efficient transportation systems. Ensuring confidentiality and information security in military logistics operations is essential.

Let's consider some key aspects that should be taken into account in safe transporting of military cargo:

**Multimodal Transportation:** The conditions of modern military operations may require transportation using various modes of transport (road, rail, maritime, air). It's important to have a system that ensures seamless transfer of cargo between different modes of transport.

**Specialized Equipment:** Storing and transporting military cargoes such as weapons, ammunition, and other equipment may require specialized vehicles and containers designed to protect against environmental influences and ensure security.

**Protection from Threats:** Military cargoes can be exposed to various threats, including physical damage, theft, cyberattacks, and more. Modern security systems using technologies like GPS, encryption, and real-time monitoring are essential for cargo protection.

**Logistics Management Systems:** Using information technology and logistics management systems allows for route optimization, reducing cargo dwell time at warehouses, and providing accurate cargo status information.

**Flexibility and Mobility:** Conditions in military operations can change rapidly, so it's crucial to have flexible logistics systems that can quickly adapt to new requirements and move together with military units.

**Environmental Aspects:** Storage and transportation of military cargoes should comply with environmental standards and regulations to minimize the negative impact on the environment.

**Training and Personnel Preparation:** Providing appropriate training to personnel regarding safety, the use of specialized equipment, and procedures for storing and transporting military cargo is vital.

Military logistics is critically important in military operations and requires constant improvement, especially in the context of modern technologies and ensuring the security of military cargo. In contemporary conditions where cyber threats are becoming increasingly serious, it is important to develop and implement effective methods to protect military communications and data. Encryption systems, biometric identification methods, and other technologies play a key role in ensuring the confidentiality of military logistics operations [2].

Additionally, there are various standards and regulations related to the security of military transportation that should be considered to understand the safety of transporting military cargo from the perspective of government regulations.

The safety of military transportation has its own standards and regulations. National and international regulatory acts establish requirements for the safety of military cargo during their transportation and storage. Research and compliance with these standards are critically important for ensuring the safety of military logistics.

To achieve a high level of security in military transportation, there are standards and regulations developed and implemented by national governments, international organizations, and agencies. Here are some of them:

**International Standards and Conventions:** Many countries adhere to standards and conventions, such as the United Nations Convention on Containers (CSC), to ensure the safety of maritime transportation of military cargo. Another example is the International Convention for the Safety of Life at Sea (SOLAS), which is of significant importance for maritime safety.

**National Rules and Standards:** Each country may develop its own rules and standards for military transportation, taking into account the characteristics of its territory, infrastructure, and security needs.

**Military Standards and Regulations:** Military organizations, such as the Armed Forces, may have their own internal standards and provisions related to the safety of military transportation. These standards can be highly detailed and specific to military operations.

**Legislation Regarding the Transportation of Hazardous Cargo:** Many countries have legislation that regulates the transportation of hazardous cargo, including ammunition and other military materials. This legislation establishes requirements for labeling, packaging, storage, and transportation of such materials.

**Control and Oversight:** In many cases, there are control and oversight bodies that conduct inspections to ensure compliance with established standards and regulations. These bodies can be military, civilian, or joint entities.

**Specialized Training and Education:** Military personnel involved in transportation typically undergo specialized training and education on safety and the efficiency of military transportation.

It's important to consider that the safety of military transport is a complex task and can vary depending on the type of cargo, mode of transport, location, and the specifics of military operations. Therefore, regulations and standards in this field are subject to continuous improvement and adaptation to changing conditions.

So, let's consider some of the most common standards and regulations that define requirements and procedures for ensuring the safety of military cargo during its transportation and storage. Here are some of them:

**STANAG (NATO Standardization Agreement):** STANAG is a series of standards adopted by NATO for military standardization. They cover various aspects of military transport safety, including cargo classification, labeling, packaging, as well as rules and procedures for their transportation [3].

**IATA Dangerous Goods Regulations (DGR):** These are international standards developed by the International Air Transport Association (IATA) that regulate the transportation of dangerous goods by air. They include requirements for packaging, labeling, and documentation for the safe transportation of such cargo [4].

**UN Recommendations on the Transport of Dangerous Goods:** This document from the United Nations contains recommendations for the transport of dangerous goods by any mode of transport. It includes cargo classification and requirements for packaging and labeling [5].

**IMDG Code (International Maritime Dangerous Goods Code):** This code regulates the transport of dangerous goods by sea. It defines rules for the classification, labeling, and packaging of such cargo.

**ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road):** This agreement regulates the transport of dangerous goods by road in Europe. It establishes requirements for packaging, labeling, and documentation.

**CFR (Code of Federal Regulations):** In the United States, CFR contains rules and requirements for the safe transport of various types of cargo, including military goods.

These standards and regulations are aimed at ensuring the safety of military transport and establish requirements for labeling, packaging, documentation, and other aspects of transporting military cargo to prevent danger and negative consequences from their transportation.

Since military goods can also be classified as dangerous goods type we can also review standards which are implied for such types of goods.

Classes of dangerous substances:

class 1 — explosive substances and products;

class 2 — gases;

class 3 — flammable liquids;

class 4.1 — flammable solids;

class 4.2 — substances prone to spontaneous combustion;

class 4.3 — substances that emit flammable gases when interacting with water;

- class 5.1 — oxidizing substances;
- class 5.2 — organic peroxides;
- class 6.1 — toxic substances;
- class 6.2 — infectious substances;
- class 7 — radioactive materials;
- class 8 — corrosive substances;
- class 9 — other dangerous substances and articles.

The transportation of dangerous goods is regulated by national and international regulatory documents. One of the most important international documents governing the transportation of dangerous goods is the "Agreement concerning the International Carriage of Dangerous Goods by Road" (ADR), which pertains to road transport, and the "International Maritime Dangerous Goods Code" (IMDG Code) for maritime transport.

Key rules and requirements for the transportation of dangerous goods include:

**Labeling and classification:** Dangerous goods must be correctly classified and labeled. Classification determines the nature of the hazard, and labeling includes labels, placards, and other indicators for hazard identification.

**Packaging:** Dangerous goods must be properly packaged to prevent leaks, damage, or other adverse consequences.

**Documentation:** It is important to have the correct documentation for dangerous goods, including declarations, licenses, and other documents.

**Vehicles and containers:** Vehicles and containers must meet the requirements for the transportation of dangerous goods.

**Safety rules:** Personnel working with dangerous goods must be trained and adhere to safety rules.

**Emergency measures:** Plans for responding to emergencies, such as leaks or accidents, must be developed.

In Ukraine, the safety of military transportation is regulated by various legal acts and standards that establish requirements and procedures to ensure the safety of military cargo transportation. Here are some of them:

**Law of Ukraine "On Defense":** This law defines the fundamental provisions regarding Ukraine's defense, including the organization and provision of military transportation [6].

**Law of Ukraine "On Military Duty and Military Service":** It outlines the rules and obligations of military personnel regarding the transportation of military cargo and the security requirements for this process [7].

**National Safety Standards:** Ukraine has its own safety standards for various aspects of military transportation, such as storage, packaging, and labeling of military cargo.

Internal Regulations of the Armed Forces of Ukraine: The Armed Forces of Ukraine have their own internal regulations and provisions related to the safety of military transportation.

International Agreements: Ukraine is a party to various international agreements and conventions that regulate the safety of military transportation, and it is obligated to comply with their requirements.

State Emergency Service of Ukraine (SESU): SESU is responsible for organizing and coordinating actions related to civil defense and population protection in case of a military conflict, and it may also have internal regulations regarding transportation safety [8].

Ministry of Defense of Ukraine: The Ministry of Defense establishes provisions and standards for the Armed Forces of Ukraine, including safety requirements for military transportation.

Aviation and Maritime Rules: In the case of military cargo transportation by air or sea, the relevant rules and requirements established by aviation and maritime organizations apply.

These legal acts and standards collectively ensure the safety of military transportation in Ukraine and provide guidelines for the proper handling of military cargo to prevent accidents and hazards.

These legal acts and standards are aimed at ensuring the safety of military transportation in Ukraine, including measures for the preservation of military cargo, transportation safety, requirements for personnel and technical means. Compliance with them is an important aspect of national defense and security.

A key element in all of this is the development and improvement of these standards and regulations in military transportation safety. Therefore, the development of standards and regulations in the safety of military transportation in Ukraine is a constant and dynamic process, especially in the conditions of armed conflict and changing threats to national security. Some of the important aspects include:

Cooperation with international organizations: Ukraine actively collaborates with international organizations such as the UN, NATO, and the OSCE to improve standards and procedures in the safety of military transportation at the international level.

Adaptation to modern threats: Due to changes in modern threats and the development of new technologies, Ukraine constantly reviews and adapts standards and regulations to account for these factors.

Development and implementation of new technologies: Ukraine is working on the development and implementation of new technologies to

enhance the safety of military transportation, such as monitoring systems, protection against cyberattacks, and the improvement of logistics management systems.

Adoption of best practices: Ukraine studies the experiences and best practices of other countries and organizations in the field of military transportation safety and implements its own improvements.

Personnel qualification improvement: Providing training and improving the qualifications of personnel responsible for the safety of military transportation is an important part of developing standards in this area.

Cooperation with the civilian sector: Ukraine cooperates with the civilian sector, including logistics companies and transportation enterprises, to provide resources and expertise in the field of military transportation safety.

Creation of a national security strategy: Ukraine develops and enhances a national security strategy that includes issues related to the safety of military transportation and regulation in this area.

These directions enable Ukraine to maintain and improve standards and regulations in the safety away from military transportation to ensure national security and the effectiveness of military operations.

Safe transportation of military cargo is critically important in modern military logistics, especially in the context of a prolonged conflict with an aggressive neighbor like the Russian Federation. Several key factors underline the significance of this need.

Firstly, the intentions of Russia and its temporary occupation of Ukrainian territories have created a constant threat to Ukraine's national security. In a protracted military conflict, there is a continuous requirement to establish and sustain various military groups on different fronts. Safe transportation of military equipment and resources is crucial for achieving these objectives.

Secondly, ensuring the reliability and integrity of military resources is of paramount importance. Inadequate transportation can result in losses of both material and human resources, negatively impacting combat readiness and operational effectiveness.

Additionally, contemporary warfare brings new challenges, such as cyber threats and the risk of compromising information confidentiality. Therefore, security and protection against such threats have become vital aspects of military cargo transportation.

In times belonging to armed conflicts, every resource, from ammunition to equipment, holds critical value. Safe transportation is the linchpin for



preserving these resources, ensuring operational efficiency, and safeguarding national security. Consequently, it remains one of the most pivotal components related to modern military logistics in Ukraine.

### **Conclusions**

Safe transportation referring to military cargo is a guarantee of success in contemporary military conflicts. It necessitates collaboration among various government branches and the development and implementation away from new technologies to counter emerging threats. Ensuring security in this domain remains a critical task for safeguarding national security and military readiness.

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