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# OPTIMIZATION OF INFORMATION PROCESSING IN THE LOGISTICS MANAGEMENT SYSTEM IN THE ARMY

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***Abstract.*** Due to the growing volume of information and the complexity of military operations, managing logistics in the armed forces has become increasingly challenging. This article explores the key issues affecting the logistics system, particularly in the management of motor vehicle provision and the flow of information. Despite having advanced equipment and technical resources, inefficiencies in data processing, the geographic spread of military units, and a lack of automation continue to limit operational effectiveness. The article identifies several challenges, including unorganized data collection, the absence of effective forecasting tools, and the need for streamlined processes. To tackle these issues, it proposes practical solutions such as developing algorithms to calculate vehicle and spare part demand, automating information flows, optimizing material transportation, and creating centralized logistics systems.

Implementing modern information technologies and improving reporting and accounting processes will simplify operations, reduce resource waste, and enhance decision-making. The article emphasizes the need to introduce a technological approach to improve the efficiency and combat readiness of military logistics systems.

**Keywords:** military logistics, management, information flow, information sources, increasing efficiency

## Introduction

Despite the use of advanced information technologies to optimize daily work in the army, the importance of increasing the efficiency of collecting and processing information, simplifying, regulating and optimizing it to fully cover the ever-increasing volume of incoming information is relevant. This includes simplifying, regulating, and optimizing these systems to effectively manage the ever-growing volume of incoming data. The challenge is not only to cope with the enormous volume of information, but also to ensure that it is processed and used in a way that supports decision-making and improves operational efficiency.

According to the analysis of the logistics management system in the armed forces, despite the sufficient number of existing sources of information (transmitting and receiving information flow), the high level of technical maintenance and repair provided them, the increasing amount of modern equipment and the growing number of tasks performed by military units have strained the existing system. The reforms carried out in the restructuring of the army have led to a significant increase in the volume of information received by the central management body, necessitating more advanced methods to manage and process this data effectively.

A detailed analysis of the logistics management system in the armed forces reveals the critical role and importance of military vehicles and high strategic status of the troops included in the structural composition of countries' armed forces. Thus, more than 80% of the total vehicles used in all service branches are of different types, purposes and exploitation groups. [1, 2, 3].

This broad range of vehicles plays a vital role in ensuring the mobility, effectiveness, and combat readiness of the troops, which adds another layer of complexity to the logistics management system. Given the significant volume of data related to these vehicles, such as maintenance schedules, repair needs, and spare parts inventory, it becomes increasingly important to improve and enhance the existing information system to ensure smooth and efficient operations across military units. Evolving military

logistics requires continuous improvement in data processing technologies to maintain optimal levels of performance in military operations.

## Logistics management system in the army

Considering the large-scale use of motor vehicles, to ensure a high level of combat readiness of troops, the importance of timely and correct organization of the following vehicle provision tasks should be noted [4]:

1. Provisioning and inventory management – ensuring timely and accurate supply of vehicles and spare parts while maintaining systematic record-keeping.
2. Operational readiness – keeping vehicles in combat-ready condition through preventive and corrective maintenance.
3. Maintenance and repairs – conducting timely repairs and replacing malfunctioning components.
4. Personnel training – enhancing the skills of drivers and technical personnel for effective vehicle service and maintenance.
5. Automation of logistics management – implementing digital solutions to streamline and enhance logistical operations.

Implementation of the above-mentioned tasks is ensured by the interaction of forces and means that establishes the logistics system. One of the main elements of the logistics system in the army is the management of objects in this area by increasing the efficiency of information flow process.

The supply of military units is considered as a subsystem of the army's logistics system. The effective functioning of this system suffers if its elements (accounting, reporting, planning, monitoring, provisioning and organizing) are not carried out precisely.

The geographic location of military units has a significant impact on the logistics management system. Most units are stationed far from the central management body, typically at distances of 300 to 500 kilometers. Many of these units operate in the field and are geographically isolated, making coordination and logistics support more challenging. These factors are of particular importance in the logistics management system, transmission, collection, processing, protection of information, and making the right decisions in time.

**Information flow and processing in military logistics management.** In the field of technical support, information flows are generated through the execution of the following operations, as well as the collection, storage, processing, and transmission of relevant data, including the preparation and transfer of orders, requests, decisions, and other necessary documents. The exchange of information, which is considered the main element of the logistics system, is carried out by correspondence between the central management body and subordinate military units. Research shows that the direct interaction of each military unit with the centre, as well as the lack of use of modern information technologies in the logistics management system, led to an increase in the volume of information collected at the centre and creates issues in its processing.

The above factors determine the need to check the correctness and adequacy of information flow, including how and by whom control is carried out, the rules for verifying and reconciling the information received, the loss of all or any part of the information, protection, collection, forecasting and storage analysis in the logistics management system.

To address these inefficiencies, it is necessary to:

- Verify and standardize the accuracy and adequacy of received data.
- Establish control measures for reconciling and validating information.
- Minimize information loss and improve data storage and retrieval systems.
- Develop predictive models for demand forecasting.

The volume of information processed in the army logistics system is quite large. For instance, a military unit with an average of 250 vehicles every month generates up to 1.000 permit documents (permission to leave a unit), 100 spare part purchase orders, 50–60 maintenance and repair reports, and up to 30 additional planning and accounting documents [5].

According to statistical data, every year, the information received from the troops by the logistics management system amounts to approximately 67.325 documents, equivalent to 527.288 A4-sized pages of text. The distribution of these documents is as follows:

– automobile property acquisition documents – 48.838;
– documents related to the repair of automobile equipment – 1.555;
– acquisition and decommissioning records for automobile equipment – 5.582;
– documents related to motor transport operations management – 10.850;
– other activities – more than 500.

The entire process of information flow between the central management body, military units and other information sources in the logistics system of the troops is shown on the figure. As it can be seen from the figure, the entire information flow consists of three main blocks. The first block is the "incoming information flow", the second block is the "information processed in the centre", the third block is the "outgoing information flow".

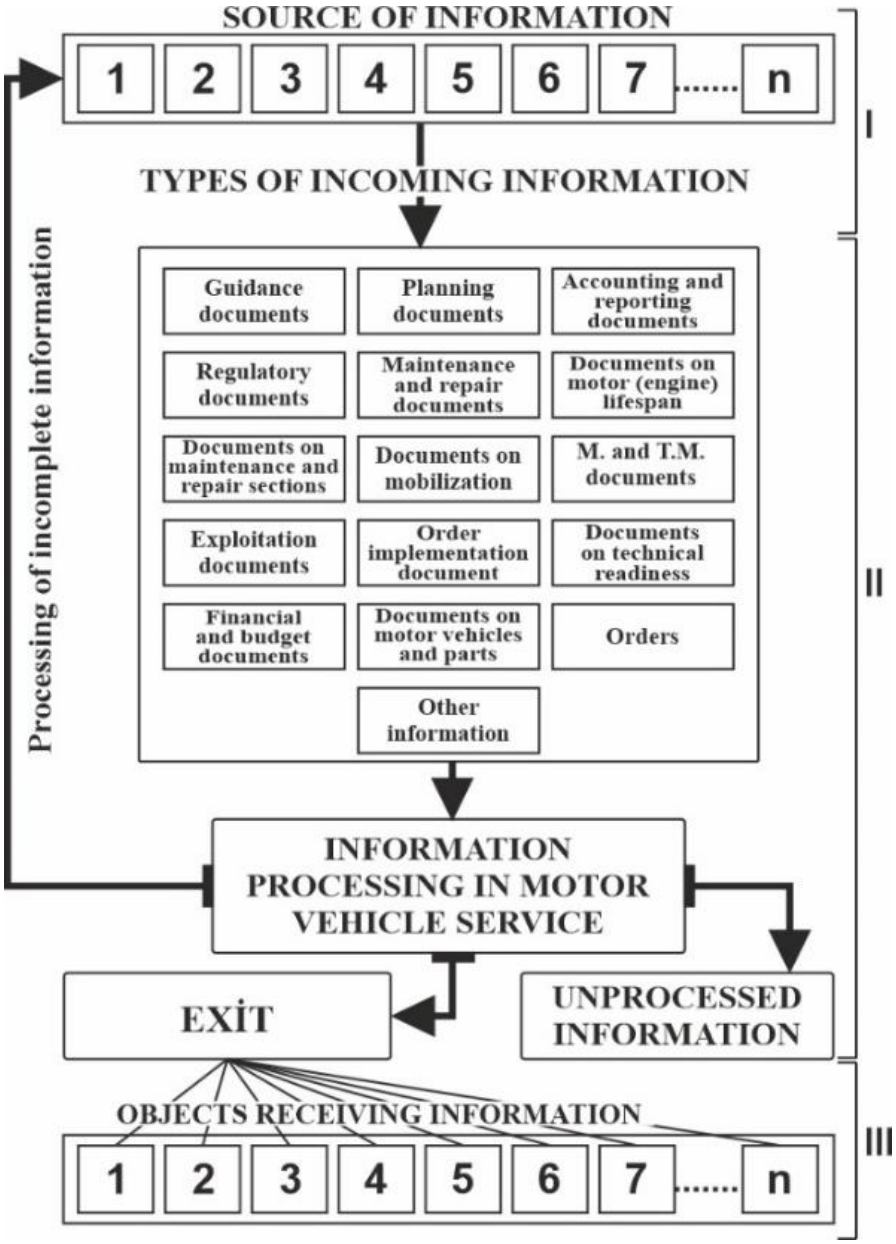


**Figure. Information flow in logistics system management:**
1 – main headquarters; 2 – departments of main headquarters; 3 – civil organizations;
4 – management departments of service branches, 5-6 – management departments of military units;
7 – military repair facilities; n – other sources of information

As shown on the figure, a huge volume of logistics information (guidance documents, regulatory and survey data, planning and accounting documents, information about equipment and spare parts, their maintenance and repair; information about service specialists and engineering personnel, other documents affecting the efficiency of motor vehicle support) is received, processed, and stored at the centre.

From the figure we can see that the "incoming information flow" block directly receives information from the main and other sources of information and transfers it to the centre. Even though the 4th, 5th and 6th sources of information, that make up the main part of the troops, are grouped and operated as part of units, the information flow emanating from them are not generalized, simplified and staged. As a result, the volume of information sent to the second block significantly increases, the control of this information by the command of military units is weakened, the principle of unified control is violated, and the consumption of material resources (transportation, support and supply) increases during solving practical problems.

All information from the first block must be received and processed in the second block, decisions must be made on its basis, then new documents for the implementation of these decisions must be prepared and sent to the third block. The main part of the information received by the central management body consists of acts, records and reports on the acquisition of motor vehicle equipment and spare parts, their repair and disposal. Experience shows that more than 25% of the information (documents) from this category is returned, because it does not meet the requirements, and a certain part remains unprocessed because it does not comply with the logistic support plan.

The study showed that the limited number of personnel in the central management body, the huge amount of other service tasks, and the lack of a system algorithm for processing information flow in the second block do not allow this block to process part of the irregularly (chaotically) incoming information. A certain part of the information processed in the second block is transferred to the third block, and part of the information remains for accounting, forecasting and delivery to addresses for processing.

All of three blocks are inextricably linked and information in them is constantly flowing. The information flow is considered as a continuous, constantly changing cyclic process. Sources of information that create this flow and influence its characteristics also become a part of cyclical process.

The amount of information processed is mainly determined by supply and demand. The basic operations of information processing and decision-making are sorted according to various criteria. This may include the provision of vehicles and spare parts, types of repairs and necessary parts, the importance of departments, production and repair, service specialists, etc.

**Challenges and gaps in the information flow and logistics management system.** Research and observations show that the current situation has led to a number of serious problems in the delivering and processing of information flows, as well as to a slowdown in the process of improvement in this area. Following are the examples:

– underdevelopment of the mechanism for collecting and summarizing the flow of information processed in military units and prepared for transmission to a higher management body at the unit level;

– failure to conduct researches on expanding the functions of management bodies of units in the logistics management system;

– failure to determine the frequency of sending information to the central management body;

– failure to develop an algorithm and calculation program in the field of providing vehicles in military units with motor vehicles in the next calendar year;

– failure to establish stages of simplifying the information flow process;

– inability to develop an algorithm that optimizes the transportation of material assets, etc.

**Proposals for optimizing information flow and enhancing logistics management in military units.** It is relevant to develop proposals and methods for grouping information (documents) used in military units according to their nature and purpose.

By using modern information technologies in the logistics management system, it is possible to automate the transfer of information and, as a result, facilitate the work of service managers, save time and material resources, and optimize information processing.

It is important to develop a new program for preparing an annual plan for the maintenance and repair of motor vehicles of a military unit. This program must include the reporting of spare parts that need to be purchased for vehicles in the next calendar year. [6]

To optimize transportation and improve efficiency, it is necessary to develop a methodology that determines the frequency of purchases of motor vehicles considering demand.

To enhance the activities of supply units in the army, a program that turns them into a means of transferring supplies between military units and central bases (warehouses), and ensures the work of these units in supply services must be developed.

Considering the above, the development and programming of an algorithm for calculating the demand for motor vehicles and spare parts, dividing the process of their acquisition into stages, simplifying documentation, automating accounting and reporting, optimizing the processing of information flow are important tasks.

## Conclusion

Given the large volume of information flowing through the logistics management system and the unique ways motor vehicles are used in different units, it's essential to establish an organized and efficient process at every level, adopting a modern, technology-driven approach. This means developing algorithms to accurately calculate the demand for vehicles and spare parts, automating data transfer processes to reduce manual work, and setting up centralized logistics systems that streamline information flow. By improving how data is collected, processed, and used, we can cut down on resource waste and make decision-making faster and more reliable. Investing in modern information technologies and refining reporting and accounting processes will not only simplify day-to-day operations but also ensure that military logistics keep pace with the demands of modern warfare. Ultimately, embracing these changes will make logistics management more efficient, allowing the armed forces to stay agile, prepared, and ready for any situation.

The article puts forward practical and well-reasoned proposals to make logistics management more efficient and streamlined. One of the key recommendations is to group information flows in a way that makes them easier to process and deliver. Automating the transfer of data and optimizing its processing frequency are also crucial steps to ensure smooth operations and reduce manual workload.

A major focus of the article is on developing and implementing algorithms that can accurately predict the demand for motor vehicles and spare parts for the upcoming calendar year. By breaking down the acquisition process into well-defined stages, it becomes easier to manage and monitor each step. Additionally, simplifying documentation tasks and automating accounting and reporting processes will save time and resources while minimizing errors.

Creating a centralized system is vital to bringing all these improvements together. Such a system will not only enhance data accuracy and efficiency but also support better decision-making and resource management. By leveraging modern information technologies, the logistics management system can become more responsive, agile, and capable of meeting the demands of today's military operations.

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## Xülasə
## Orduda logistikanın idarəetmə sistemində informasiya emalının optimallaşdırılması
**Günel Zeynalova**

Hərbi əməliyyatların mürəkkəbliyi və gündəlik artan məlumat həcmi orduda logistikanın idarə edilməsini getdikcə çətinləşdirir. Bu məqalədə logistika sisteminə təsir edən əsas məsələlər, xüsusən də avtonəqliyyat vasitələri ilə təminat və məlumat axınının idarə olunması araşdırılır. Orduda müasir avadanlıqların, yüksək texnoloji resursların və kifayət qədər inkişaf etmiş texniki bazanın mövcudluğuna baxmayaraq, logistika əməliyyatlarının səmərəliliyi hələ də məlumatların işlənmə həcminin və mürəkkəbliyinin artmasına səbəb olan bir sıra problemlərlə məhdudlaşır, bu da məlumatların işlənməsini çətinləşdirir.

Məqalədə strukturlaşdırılmamış məlumatların toplanması, ehtiyacların proqnozlaşdırılması üçün effektiv vasitələrin və informasiyanın göndərilmə tezliyinin müəyyən edilməsi üçün aydın metodologiyanın olmaması, alınan məlumatların həcmi ilə müəyyən edilmiş tələblər arasında uyğunsuzluq kimi bir sıra problemlər müəyyən edilir. Yanlış məlumat emalı ilə bağlı problemlər isə bütün logistika prosesinin səmərəliliyinə mənfi təsir göstərir. Bu problemlərin həlli üçün nəqliyyat vasitələrinə və ehtiyat hissələrinə tələbatın hesablanması alqoritmlərinin işlənib hazırlanması, məlumat axınının avtomatlaşdırılması, informasiya mübadiləsinin optimallaşdırılması və mərkəzləşdirilmiş logistika sistemlərinin yaradılması kimi praktik həllər təklif olunur.

Müasir informasiya texnologiyalarının tətbiqi, hesabat və qeydiyyat proseslərinin təkmilləşdirilməsi əməliyyatları sadələşdirəcək, resursların israfını azaldacaq və qərarların qəbulu prosesini təkmilləşdirəcəkdir. Məqalədə hərbi logistika sistemlərinin səmərəliliyinin və döyüş hazırlığının artırılması üçün texnoloji yanaşmanın tətbiqinin zəruriliyi vurğulanır.

**Açar sözlər:** hərbi logistika, idarəetmə, informasiya axını, informasiya mənbəyi, effektivliyin artırılması

## Аннотация
## Оптимизация обработки информации в системе управления логистикой армии
**Гюнель Зейналова**

В данной статье рассматриваются ключевые вопросы, оказывающие влияние на управление логистической системы вооруженных сил, с особым акцентом на поставку транспортных средств и управление потоками данных. Несмотря на наличие современного оборудования, высокотехнологичных ресурсов и достаточно развитой технической базы, эффективность логистических операций все еще ограничена рядом проблем, приводящим к увеличению объема и сложности обработки данных, что затрудняет принятие оперативных решений.

В статье обозначен ряд проблем, таких как неструктурированный сбор данных, недостаток эффективных инструментов для прогнозирования потребностей, отсутствие четкой методологии для определения частоты отправки информации, а также несоответствие объемов получаемой информации установленным требованиям. Проблемы, связанные с неправильной обработкой информации, также сказываются на эффективности всего логистического процесса. Для решения этих проблем предлагаются практические решения, такие как разработка алгоритмов расчета

спроса на транспортные средства и запчасти, автоматизация потоков данных, оптимизация обмена информацией и создание централизованных логистических систем.

Внедрение современных информационных технологий, усовершенствование процессов отчетности и учета позволят упростить операции, сократить растрату ресурсов и улучшить процесс принятия решений. В статье подчеркивается необходимость внедрения технологического подхода для повышения эффективности и боеготовности систем военной логистики.

**Ключевые слова:** военная логистика, управление, поток информации, источники информации, повышение эффективности

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