THEORETICAL APPROACHES REGARDING SUPPLY WITHIN THE MILITARY ORGANIZATION

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Abstract: *Over time, the evolution of societies has been influenced by the available resources, so it can be appreciated that all organizations, regardless of their type, are functionally dependent on their own logistics, especially on the capabilities of its main fields. From the perspective of carrying out military actions, both in peacetime and at war, logistics represents the bridge between the fighting forces and the necessary logistical support given to the structures of the National Security System, who will have at their disposal all the resources necessary to fulfill the objectives and missions. A very important field of military logistics is supply, representing the factor on which will depend the totality of the activities carried out for establishing the necessary making stocks, as well as carrying out procurement procedures for equipping and supporting the forces with technique, equipment, and material goods.*

Keywords: *military logistics, supply, methods, optimization.*

1. INTRODUCTION

With the increase in the degree of complexity of human activities and the development of technology, especially in the era of artificial intelligence, there was a strong need to adapt organizations to new challenges, to the demands of society and consumers, which have become increasingly diversified.

The appearance of logistics is closely related to the military field, namely to the need of military forces to supply themselves during conflicts, to the appearance of organized armies, to the need to provide them with resources, as well as equipping them with equipment and technique.

For the first time, the concept of logistics was defined as a set of activities on the line of material provision that allows the troops to move, live, and fight with all the necessary personnel and material support [1].

Logistics is the science mainly concerned with the aspects related to the supply, movement, and transport of personnel and material goods, ensuring the maintenance of technique and equipment, medical support, procurement or provision of services, evacuation of materials, accommodation and quartering of troops.

The realization of logistic support is dynamic and continuously under improvement. In order to adapt to this reality, the military entities must have at their disposal, in a timely manner and at the established place, the entire range of technique, equipment, materials and services, so that their operational capacity becomes compatible with the missions and specific objectives.

According to NATO doctrine, supply is defined as the procurement, reception, storage, transport, distribution, maintenance and recovery (evacuation) of material stocks, including determining the type and quantities in particular cases.

Within NATO, the supply of the defense operation forces must ensure the material support, which allows the rejection of the adversary's attack, the prohibition of its penetration into its own forces by maintaining the defense alignments, districts and occupied positions and creating the necessary conditions to win the initiative and to finally start the offensive [2].

2. METHODS AND MODELS USED FOR SUPPLY

Both in peace, during mobilization or in war, supply is also connected to other segments of activity such as procurement, making and managing stocks, assignment and distribution. Against this background, the application of logistics management functions is essential to ensure the resources for military actions.

History shows us the importance of logistical support, this fact can also be found in the Roman army which „understood the importance of proper supply during campaigns. Military leaders planned and ensured efficient supply lines for their troops, ensuring they had sufficient supplies of food, water, and equipment"[3].

Today, the specific activities for organizing and executing the supply of equipment and materials are:

- establishing the need to supply for consumption, calculated according to the provisions of the organizational states, endowment norms, consumption rates and/or the provisions of the plan with the main activities;
- knowing the state of operation of the equipment and what is needed for maintenance works;
- establishing the needs to exchange stocks;
- updating the record of the types and quantities of military equipment, the products and materials that are physically and morally used and that must be replaced, recovered or scrapped;
- establishing and substantiating supply priorities;
- developing the supply plan and the procurement program for the goods in the supply competence, staggered over time, depending on the forecasted financing, respectively the approved budget;
- carrying out the legal procedures for awarding contracts for the goods that fall within the own competence of supply;
- development of procurement contracts;
- organization and execution of quantitative and qualitative receptions;
- storage, conservation and preservation of materials;
- distribution of supplied materials to units and/or subunits.

The logistic supply sources represent those places from which the equipment and the permanent completion of the units, large units, and sub-units are ensured with the necessary equipment and materials.

These sources can be military production units, warehouses of military units, garrison warehouses, economic agents and national reserves, and for the territorial forces – their own formations.

Their role is to provide the fighting and protection forces with the necessary materials and equipment for the permanent provision of current consumption and the completion of losses, and consequently they have a wider scope.

As a rule, the following are used as conventional/standard sources of supply:

- territorial sources (territorial military warehouses, but especially, economic agents with state capital or even private producers);

- campaign warehouses of the upper echelon, warehouses from the residence garrisons of the existing military units in the area of action of the Operational Corps;

- warehouses of the Ministry of Internal Affairs or the Romanian Intelligence Service or other structures of the National Defense System.

Materials repaired in own workshops or in those in the area, materials collected from the battlefield, as well as materials from capture can also be considered sources of supply.

Despite the fact that logistical support used in unconventional warfare may seem difficult to achieve, it can be very practical and much more appropriate if planned in a creative and serious way by capable people.

Unlike conventional distribution where shipments run on the same supply routes and at predictable intervals, non-conventional distribution must use methods and platforms that cannot be easily traced. This includes using a variety of local and national vehicles and drivers and carrying out transport during the safest and most non-susceptible hours so as not to influence and endanger in any way the life of the local population in the vicinity of military operations.

Flexibility will be ensured by providing multiple distribution systems, so that in case one of the distribution/supply networks is compromised, another will be able to transport materials in place of the other, and forces on the battle line will not be affected and continue to carry out its mission further by receiving the logistical support necessary to fulfill it.

At the level of the Alliance, there are three basic methods of the supply system: *Push, Pull* and *Directed,* respectively:

- *push* - the logistics organization utilizes a “push” system when replenishment is based on anticipated requirements or standard consumption rates. To avoid the creation of large inventories, seamless coordination between operational and logistics planners is required, as well as the effective use of technologies such as command, control and information systems (CCIS) and asset tracking systems;

- *pull* - the logistics organization employs a “pull” system when replenishment is based on the reaction to requests from the accepted unit. In the barracks and under specific operating conditions, this system may offer economic advantages, but when enemy contact is imminent, a less risky approach may be needed, particularly due to time constraints;

- *directed* in practice, where there is uncertainty, peaks and demand values. In such cases, the commander may have to use a more proactive supply system, using a distribution-based logistics concept for inventory and storage of supply and using improved synergy between operational and logistics planners to reduce the amount of material.

A widely used model is the Supply Chain Management (SCM), which is viable for all types of organizations, effectively integrating the basic processes, from the acquisition of material goods and services to distribution to end users.

The model is aimed at optimizing the logistics system of military entities, maximizing added value, as well as timely provision of the needs of combat and support forces.

A fundamental aspect of SCM is the planning function, which involves strategies for managing resources and adapting to market demands for goods and services. The efficiency of this process depends on the accuracy of forecasts and the ability to respond quickly to changes.

The fundamental objectives of the SCM are the coordination of relations from the supplier and the economic operator to the beneficiary authority, the integration of the management of flows along the chain, based on information and data, and the ensuring of the circulation of both materials and information to obtain an optimal service [4].

Supply includes analysis, supplier selection and contract negotiation to ensure a consistent and superior quality procurement flow. Close relations with economic operators are essentialant for fast deliveries and under advantageous conditions.

In a practical way, the realization of the supply/resupply in conditions of economy, efficiency and effectiveness, requires, from the organizational phase of the procurement procedures by the military entity, the establishment in the specifications, with priority, of the obligations of the potential partners from a contractual point of view [5].

Based on the previously mentioned aspects, figure no. 1 illustrates a reliable variant of a linear supply chain applicable to military structures.

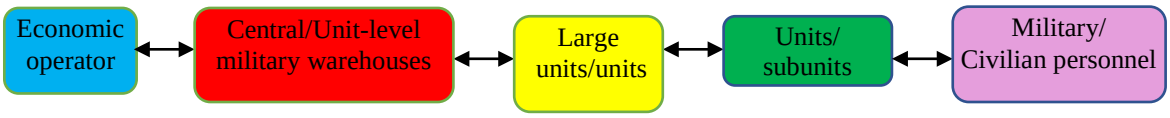

FIG.1 Linear supply chain

Delivery-specific activities involve the management of orders and transport to ensure that material goods arrive on time and in optimal conditions to beneficiaries, large units, units and military formations, contributing to the enhancement of their organizational capabilities.

SCM principles include process integration, cost optimization, flexibility, entity satisfaction, and sustainability Process integration ensures consistency in the supply chain, and cost optimization aims to minimize expenses without compromising service quality.

Modern models and technologies, such as Supply Chain Operation Reference (SCOR) and Information and Communication Technology (ICT), are essential for monitoring and optimizing SCM. The use of the Internet of Things (IoT) and Big Data enables real-time monitoring and accurate forecasting, contributing to supply chain efficiency and performance.

A model that we consider important is the SCOR, which has as fundamental objective the renewal of supply and replenishment management. Thus, a focus will be placed on processes and actions, and not on the element or compartment that performs the activity or the operation itself. This model describes all stages of customer satisfaction and is built around 5 functions - planning, procurement, production, delivery and return.

A special contribution to determining the need for material goods is the use of high-performance computer applications or programs. As an example, the Allied Commands Resource Optimization Software System (ACROSS) and Stockpile Planning Module (SPM) applications are IT applications used by NATO and national planners in the decision-making process for determining the stocks of material goods necessary to ensure the need of the forces and of the civilian population.

For the effective management of stocks, commanders and heads of military units will take into account the following:

- regarding stock planning: it is important to take into account the specific needs of each military unit in terms of equipment, food, and other supplies. Planning must be done a certain period in advance, in order to be able to make timely purchases and to avoid crisis situations;

- material goods will be stored in safe, clean and dry places. The equipment and food must be stored separately to avoid contamination or damage;
- the permanent existence of an accounting record of the stocks to facilitate their quick and efficient inventory;
- periodic control of stocks in a planned manner according to the norms in force: it is necessary that the staff responsible for managing stocks carry out regular checks to ensure that problems such as loss, damage, or expiration of products do not occur. Constant monitoring of the inflow and outflow of inventory is required so that adjustments can be made if problems arise.

3. APPLICATION OF OPERATIONAL RESEARCH IN THE FIELD OF SUPPLY

As a concept, operations research can be said to be the branch of applied mathematics and decision science that uses mathematical and statistical models to solve complex decision problems.

This refers in particular to the problems that lead to decision-making by managers, by domain, in the area of logistical, financial or human resources. In this context, examples include the use of the Electra methods, the N-W corner, A.B.C., etc. [6].

The role of operations research is to find optimal or at least satisfactory solutions to decision problems by using mathematical and statistical models that take into account several factors or variables, such as cost, time, human factor, performance requirements.

Consequently, operational research can be used to evaluate and improve the performance of existing systems by identifying weak points and proposing solutions to improve them. As examples of problems solved by using operational research methods, we mention supply and transport optimization, production planning in maintenance departments and centers, resource programming for defense, determining the optimal level of stock realization, investment planning and allocation of financial resources. These methods involve the use of artificial intelligence, namely state-of-the-art computer systems, applications, and software for the purpose of collecting, analyzing and interpreting information specific to the supply-replenishment field.

In what concerns the military organization, the management of stocks is an essential activity in the functioning of entities in optimal conditions. Therefore, stocks are made in order to support military activities and operations, both in peacetime and during war. At the same time, it can be said that the stock represents the number of products and/or materials of all classes of materials, which is constituted in peacetime and is necessary to support military efforts in situations of crisis, mobilization, or war. Its purpose is to provide the fighting troops with the necessary materials until the moment when the national economy is mobilized, wartime production is initiated and the flow of supply is clarified, either through domestic economic sources or through import.

In order to increase the performance of the supply chain within the military organization, we present and recommend the use of the A.B.C. method, which is specific to models of storage or maintenance of material goods in storage. The purpose of these model is to provide the appropriate tools that will be useful in maintaining a desired stock of goods, in order to fully satisfy the demands of consumers, but which will also have to establish a cost as low as possible in terms of concerns the maintenance, storage and handling of these products. By applying the A.B.C method, the typology and quantities of material goods supplied will be analyzed and classified according to supply values, respectively the ratio of purchases. Thus, those starting points that lead to the smooth operation of purchases can be clarified.

Based on the results, several measures can be established, from the simplification of certain ordering procedures to the number of operators in the warehouses.

The main factor for using the A.B.C. method consists in choosing an appropriate criterion, on the basis of which the allocation of materials to three groups, namely A, B, C, is established.

In order to apply this method, we will make a classification of material goods into three categories, established according to the importance and frequency of use within military structures, as follows:

- *category A* - includes all highly important goods that represent a significant value, a high level of demand to follow the storage process, stock level and consumption trends in relation to the pace and volume of materials received, but a relatively small number of items in total; these items require careful management and monitoring because they can have a significant impact on the costs and activities of the military organization;

- *category B* - the assembly of materials of medium importance are included in this category. They represent a moderate cost value and a moderate number of articles, tracked less frequently, even monthly or weekly, the level of requirement applied being a reduced one, based on the lower impact of these stocks on the organization's operations. They require proper attention and management, but not at the same level of criticality as Category A items;

- *category C* - includes items of minor importance that have a low-cost value, having a relatively large number of items, which are managed in a simpler way and may require less demanding monitoring.

In practical terms, material stocks are divided into three classes (table no. 1):

- class A: includes high-value materials constituting quantitatively 10% of the stock and 70% by value;

- class B: includes materials constituting 20% both in terms of value and quantity;

- class C: includes the materials that make up 70% of the stock in quantity and 10% in value.

Table 1. Number-value ratio in stock management

CLASS	NUMBER RATIO	VALUE RATIO
A	10	70
B	20	20
C	70	10

Since class A contains fewer materials, it is possible to check the daily stock level, to observe the level of demand and closely guard the respect of deadlines by those who deal with the supply.

With regard to B-class materials, a new strategy is adopted. It is much more efficient to bear the burden of stocks for cheaper products, at the expense of other categories of costs.

In the case of the articles that are part of category C, less severe procedures (statistical character) can be used. These will consider the decisive factors in the optimization of storage procedures (transportation expenses, source of origin, etc.).

Regarding the economic impact, as a result of using the A.B.C method, we believe that it is transmitted directly to the financial results of the military structures, thus leading to a reduction in costs and, finally, to an increase in the performance of the organization.

As a rule, the objective of supply management is to minimize expenses while ensuring efficient supply and reducing the costs associated with purchasing, transporting, and storing materials.

Through this method, investments in stocks can be significantly reduced, even with the effect of minimizing the risks of running out of material goods.

CONCLUSIONS

In the current context, characterized by globalization and unprecedented technological developments, major and multiple mutations in the sphere of operational management, as well as regional military conflicts, a quantitative and qualitative resizing at the level of resources is imperatively necessary, so that they correspond to the existing national situation at a given moment.

We appreciate that there is a direct correlation between the growth of the performance of the management of the military and logistics organization, its functional areas, namely the supply-resupply with material goods, equipment and technology, especially in the segment of goods purchases, stock creation and management.

In this sense, we consider it appropriate to apply the following directions of action:

- modeling supply costs using methods specific to operational research, aspect that will determine the reduction of purchase expenses;
- the widespread use of artificial intelligence during marketing processes and public procurement;
- revision of the stock management system at the level of the central warehouses of the unit and garrison.

At the same time, the standardization and uniformity of the logistics of the Romanian Army with those of the NATO armies, so that interoperability takes shape, is a mandatory direction for decision-makers.

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