LOGISTICS - ITS ROLE, SIGNIFICANCE AND APPROACHES

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Abstract:

Introduction/purpose:The paper presents the development of logistics as a specific field of military branch, a contemporary field of business and a scientific discipline which inspires many researchers, theorists and practitioners to approach logistical problems from various aspects. The essence of logistics is an integrated approach to all its constituent activities, which reduces costs and increases the efficiency and effectiveness of the logistics system in supporting the primary activities of an organization or a technical system. Due to intensive and multidimensional development of logistics and its applications in various fields, the need for highly educated logistics personnel with specialized knowledge for performing a wide range of activities in the logistics system is becoming increasingly necessary.
Methods: Based on the description of military, business, national and humanitarian logistics and a comparative analysis, their mutual relationship is shown.
Results: Based on the performed analysis, an explanation of the importance of studying logistics as a multidisciplinary science and pointing out the need for specific training of logistics personnel was given.
Conclusion: Logistics is intensively developing in various fields depending on the goals of the system (organizational and technical) it supports. In general, commercial logistics is evolving faster than military logistics, and many innovative commercial logistics solutions are being deployed in

military logistics. However, certain solutions that produce good results in the commercial sector do not produce adequate results in the military. Therefore, it is necessary to carry out research and study of the functioning of logistics systems in different fields and carefully integrate individual solutions into the military logistics system. As the most complex logistics system, military logistics requires specific staffing and training of logistics professionals.

Key words: logistics, military logistics, business logistics, logistics system, logistics support, integrated logistics support, education, logistics personnel.

Introduction

Logistics, through its defense, commercial and academic aspects, is intensively changing, reforming and developing in accordance with the best world standards, scientific and practical achievements. It is an area that covers numerous and very complex and responsible business and functional activities in various systems, with a high degree of importance, so in recent years logistical problems have been receiving increasing attention.

Modern needs, high and fast technical and technological development and innovative approaches in the business operations of companies and the functioning of modern armies and technical systems have led to the creation of more specific approaches to the problems covered by logistics, so that it has become a subject of constant study and improvement. Logistics, most often, is viewed, studied and implemented as a practical tool to support the business and functioning of various organizational and technical systems in achieving their goals. In addition, logistics is a field of knowledge that leads to the development of numerous approaches, methodological procedures, methods, techniques and tools to solve increasingly complex logistics problems, that is, to find rational and optimal practical solutions for managing logistics systems and processes.

Logistics issues are increasingly inspiring many researchers, theorists and practitioners to approach logistical phenomena and problems with different motives, which is why numerous terminological definitions and definitions of logistical concepts appear in the scientific and professional literature. Numerous aspects of studying logistics phenomena and solving logistic problems have led to the development of various logistics strategies, concepts, principles, processes and structures of logistics systems, that is, to the development of logistics as

a concrete practical skill and specific scientific discipline (Milenkov et al, 2015).

Although business (commercial) logistics is evolving more rapidly today than military logistics, military logistics is still far more complex than many commercial companies and plays a primary role in studying the logistics system (Pawelczyk, 2018).

The emerging conditions in which combat and non-combat operations are conducted require that the armed forces significantly improve their operational capabilities over the previous period, which also leads to a change in military logistics models and ways of providing logistics support. There is a need to modify and align the logistics system's structure with the operational philosophy of the combat forces, improve the flexibility of planning and reallocating logistics resources, and develop a logistical support model that incorporates best practices from business practice and advanced information and transportation technology while adapting to the capabilities and conditions on the ground (Acero et al, 2020).

Many facts indicate that military logisticians need to be well aware of many definitions of logistics concepts and specific applications of certain logistics solutions that come from many authors, scientific and professional associations, organizations and institutions in various areas of public and commercial sectors. It is important to emphasize that some of the innovative solutions that led to the revolution in commercial logistics do not always produce the desired results in military logistics (Beaumont, 2017).

Logistics, regardless of which sphere it belongs to, is a very complex area, generating large costs and losses, and considerable financial resources are earmarked for its functioning (Erbel & Kinsey, 2015). Logistics is therefore the area with the greatest potential to create savings and improve the business and functioning of every military, business organization and technical system. Modern armies and business organizations strive to improve and increase their values precisely by the adequate use of their logistics personnel potentials and by introducing certain technical, technological and organizational changes in the logistics system (Erbel & Kinsey, 2018), (Pînzariu & Mînea, 2019).

The aim of this paper is to present the role, importance and trends of logistics development in modern conditions, as well as to present different approaches to the study of logistics, and approaches in the education and development of military logistics professionals.

The role and importance of logistics

The intensive development of logistics over the last few decades and the need for increasing study and implementation of logistics approaches in practice have led to the emergence of a number of definitions of logistics and its concepts, proposed by both logistics professionals individually and their professional (academic and professional) associations. This has all influenced that logistics, as well as the concepts associated with it, are defined through numerous approaches, which is a consequence of the high dynamic and complex nature of the logistics context itself (different areas covered by logistics and the dynamics of the environment in which the logistics activities take place).

In current theory and practice, logistics concepts are often used with not very clearly defined differences, which further complicates such a complex field in terms of self-understanding of certain terminological definitions, and even to their misinterpretation and misapplication in practice. The study, understanding, and definition of logistics and its concepts, in essence, depends on the angle of observation of logistics phenomena by the actors themselves (researchers, theorists, practitioners).

It is well known that numerous approaches and disciplines from different fields and with different aspects deal with the problem of defining, designing, analyzing the work and supporting the work of organizational, technical and other systems. However, it is logistics that provides a comprehensive analysis and integration of numerous practical approaches and scientific disciplines and achievements into a single system, making it a distinct multidisciplinary scientific field and specific practical skill (Andrejić & Milenkov, 2012).

In practical terms, the term "logistics" means a skill that addresses the problems of securing resources and providing support in achieving the goals and functions of a supported system. In the scientific sense, the term "logistics" means a certain discipline that seeks to find methods of

planning, managing and optimizing flows of materials, services, energy, information and capital in order to achieve certain effects[1].

Logistics, as a scientific discipline, enables the integration of a wide range of logistical activities into a single logistics system, using various scientific and practical achievements. In this way, efficient management of logistics requirements and logistic activities is achieved, from the place and time of their occurrence to the place and time of their satisfaction, with the possibility of adding additional value along the logistics flow (Fugate et al, 2011). Thus, logistics seeks to find rational and optimal practical solutions through the integration of many technical, technological, organizational, economic, legal, environmental and other disciplines, using various mathematical methods, heuristic rules, information technologies, experience and expertise. For this reason, logistics in scientific circles is classified as a multidisciplinary scientific discipline (Milenkov et al, 2015).

In order to understand that logistics today has grown into a distinct scientific discipline, it should be emphasized that it relies on recognized scientific and professional approaches and disciplines such as: reliability, cost effectiveness, system engineering, system effectiveness, integral support, cybernetics, various mathematical - statistical methods, probability calculus, operational research, simulations, etc. (Blanchard, 2014), (Langford, 2007).

Logistics intensively utilizes the capabilities of modern information and telecommunications technologies so that it is able to analyze and monitor complex processes in various systems in detail. On this basis, logistics can forecast the development of various processes and systems, as well as their cost, needs and capabilities; it can also optimize these processes and systems from economic, technical, technological, environmental, organizational or other aspects.

Many logistical aspects are stochastic, dynamic and nonlinear in nature, causing the logistics system to be highly sensitive even to small disturbances. It is therefore very important to establish adequate governance mechanisms. Process management and control in the logistics system is based on many distributed and hierarchically organized levels. Decision makers, logistics professionals and users of logistics products and services have different interests and goals,

[1] Logistics effects in commercial organizations are primarily about reducing costs and increasing profits. In non-profit organizations, such as military and humanitarian organizations, logistical effects relate to the effective provision of services that enable those organizations to have the high level of competency required.

different educational levels and diverse work experience and competencies. They all observe, study and analyze logistical phenomena, the logistics system and logistical problems from different angles and in different ways, and generally make many decisions based on subjective perception and subjectively selected criteria and estimated parameters.

In general, logistics is a very complex system with many generated multidimensional features by various elements, functions, processes and activities. The complexity of a logistics system requires that its management be based on a number of parameters and performance. Logistics performance measurement consists of a methodology for analyzing resources to monitor and control operations (activities) within logistics functions (Fugate et al, 2011), (Glas et al, 2013).

In the literature, efficiency is singled out as a key logistical performance. The terms effectiveness and efficiency have different meanings and contextual meanings according to the system supported by logistics. In addition, the environment in which logistics operates often leads to the opposite and tension in striking a certain balance between this value, as achieving one value can be detrimental to another. Logisticians therefore have a great role to play in understanding and balancing these two conflicting requirements, while making their added value, competitive advantage, their knowledge, ability and capacity (Jobbagy, 2009), (Fugate et al, 2011).

Logistics, due to its multidisciplinary nature and the wide range of activities it covers in different fields, has a different role and importance in these fields. There are also different approaches to analyzing it, studying terminology.

In the modern scientific and professional community, logistics is most often analyzed and studied from a military and business perspective, and for ease of understanding, the terms military logistics and business logistics have been introduced (McGinnis, 1992). Also, logistics is often analyzed and studied from the point of view of the life span of the asset (technical system), where the term integral logistics support was introduced (Blanchard, 2014). In addition, logistics is often analyzed from the standpoint of support to state and economic institutions where the concept of national logistics was introduced (Stanojević et al, 2017a), as well as from the point of view of supporting the rescue and care of people, animals and material resources in crisis and accident situations where the term humanitarian logistics was introduced (Kovács & Spens, 2007), as well as many other definitions, according to the fields of its operation.

Trends in military logistics development

Logistics has long been recognized as a vital component of the existence and functioning of military forces and its role has never lost its significance throughout history. The development of logistics is most often linked to what is nowadays considered military logistics. Ancient historians used the term "logistics" to refer to numerous military functions.

In general, the intensity of the development of military logistics has changed dynamically through the epochs, depending on the development of war skills and technical and technological achievements. Historically, logistical activities have always been linked to the creation, development and support of military forces through the provision and maintenance of weapons and military equipment, the supply of ordnance, the resolution of food and water supply for humans and animals, the provision of movement, health care, protection against atmospheric influences, etc.

The role of logistics for the armed forces today is even more significant than in the earlier period. Logistics emerges directly as a key factor in the creation, development, maintenance and use of military units to conduct a wide range of operations in peace, emergency and war. Logistics is also considered to play a crucial role in the strategic, operational and tactical level of decision-making, since the effectiveness and sustainability of military forces in deployment, whether in military or non-military operations, largely depends on the capabilities of the logistics system. Without adequate and efficient logistical support, a successful military operation cannot be imagined, as logistics is most often a limiting factor. Quite simply, one can engage as many forces as one can logistically support them. All other forces that are engaged are in constant danger of destruction, especially if they cannot be supported by the "energy of war", ie. by ammunition and propellants.

Emerging changes in the security environment and rapid technical and technological innovations constantly require the armed forces to increase their overall fire, space, time and maneuverability, operational capability and mobility, while improving command and logistics support. Armed conflicts are increasingly of an asymmetrical character, requiring new elaboration and implementation of different concepts of use of military forces and logistical support. In modern armed conflicts, military operations are conducted under completely changed conditions in comparison with traditional conflicts. Contemporary challenges indicate that there is a growing presence of the combined concept of the use of

military forces across the spectrum of operations: land, sea, air, space, information and cyber environments.

Modern military operations are planned, prepared and executed under the influence of various factors and circumstances, and the emerging operating environment can be described as a hybrid environment (multidimensional, imprecise, non-linear, distributed, simultaneous, integrated, high-speed operation, increased mortality, nuclear uncertainty, greater transparency due to advances in information technology). This certainly requires that the armed forces must be equipped with increasingly complex and expensive military equipment and a variety of weapons. These facts have the effect that many new tasks and challenges are posed daily for military logistics. Logistics must therefore constantly adjust its capabilities to ensure full support for the military, and also create the conditions for the continuous development of its own logistics support system so that it can respond quickly and adapt its capabilities to changes in the environment.

The literature often states that logistics is the oxygen and life force of any army. Logistics provides the generation of one of the key and perhaps most complex and interconnected capabilities of today's armed forces, which is the ability for military units to function, grow, and grow continuously. In modern armies, logistics capabilities are often described by attributes such as agility, sustainability, reactivity and efficiency. In addition, the capacity of the logistics system is measured by the intellectual and technological breadth, depth, complexity and significance of the activities in all logistics functions.

From the standpoint of logistical support, the Joint Force operation is the most complex, and therefore, in modern armies, there is a very strong tendency that in such an operation a logistics system, based on the potential of national and multinational logistics, must be organized in such a way as to provide focused, functional, effective, efficiency, flexible and informative support (Kumar & Chia, 2012). Numerous analyzes show that military logistics is far more complex than even the world's most advanced business companies (Beaumont, 2017), (Pawelczyk, 2018).

The criticality of military logistics is not a new phenomenon and problem. However, military logistics today has a much more complex nature due to the integration of different areas that are targeted and directly involved in supporting the military forces. Military logistics, on the one hand, has its deep roots in the national economy and civilian logistics systems dominated by civilian principles and influences from civilian authorities. The criteria for assessing the capabilities of civilian logistics used by civilian executives are quite different from the criteria

used by military commanders, and these criteria may very often be at odds. The main criterion for evaluating civilian logistics is efficiency. On the other hand, the end product of military logistics lies in combat force operations dominated by military principles and the influence of military authorities, and the main criterion for evaluating the military logistics system is its effectiveness in creating and maintaining combat forces in action against the enemy. These two values, efficiency and effectiveness, often compete in formulating decision-making criteria that affect all policies, strategies, concepts and approaches to the development of logistical support systems (Jobbagy, 2009), (Fugate et al, 2011).

There are numerous features that characterize efficient and effective logistical support, most often through the following approaches and principles: Unity of Effort, Visibility, Rapid and Precise Response, Responsiveness, Simplicity, Economy, Flexibility, Balance, Foresight, Sustainability, Survivability, Integration, Attainability. (Pînzariu & Mînea, 2019)

Military logistics has proven itself in a large number of military operations and its development can often trigger the domestic defense industry. Military analysts estimate that the global market for military logistics services is constantly growing (Perlo-Freeman & Sköns, 2008), (Jackson, 2012). In addition, logistics costs in the defense sector play a significant role and are subject to constant monitoring and strict control. It is important to emphasize that, despite the reduction of budgetary resources and the constant limitation of logistics capacities and resources, significant defense budget resources are still being spent in the field of logistics. If only public procurement carried out in the defense system is considered, in some modern armies about 60% of the budget is spent in the field of logistics for the procurement of weapons, goods and services (Nikou & Moschuris, 2016).

After the Cold War, great efforts were made in the transformation of the armed forces, primarily through the reduction of their number and the restructuring of formations, which led to a significant decrease in logistical capacities, but also to an increase in external suppliers. Today, the armed forces do not aspire to numbers as they once did, but to greater flexibility and operational capability to operate in a wide range of operations, which directly influences the concept of logistical support (Pawelczyk, 2018).

It is common knowledge that many logistics activities are becoming more complex on a daily basis, the requirements for logistical support

and logistics services provided by third parties are increasing daily, standards are becoming more stringent, financial resources are constantly being restricted, relationships are becoming more professional, and therefore logistics problems are becoming more complex and they are looking for specific knowledge that logisticians need to have in order to solve them as well as possible.

Logistical staff plays an important role in the entire field of administrative and operational affairs, which is reflected in: creating general and special conditions for the safe functioning of the logistics system and reducing the uncertainty of logistics support; development and implementation of new models in the logistics system that achieve rationalization of utilization of available resources and optimization of costs; increasing the quality of logistics support and customer service requirements with a greater level of specialized knowledge; taking numerous measures to protect resources of all kinds, etc.

The impact of business logistics on military logistics

The introduction of logistics terms, concepts and principles in the military sphere for civilian purposes began in the 1960s, which led to the complete economic affirmation of logistics and the development of business logistics.

Logistics in business (commercial) systems is seen as a management function, that is, a form of integrated planning, design, implementation and control of flows of materials, products and services, with optimal use of various resources, energy and information, both within the observed economic, business or social system, and between the system itself and its customers (business partners) (Ballou, 2007).

Generally, the term "business logistics" covers the integrated management, planning and control of (all) activities related to the complete flow of products from its source to the end-user, including raw material producers. However, in the 1980s, a new term "supply chain management" emerged, integrating logistics with strategic planning, information management, marketing and finance (Ballou, 2007).

In today's environment, the development of business (commercial) logistics, that is, supply chain management, is faster than military logistics. The development of commercial logistics is inextricably linked to the development of production, transport, storage, distribution, informatics, telecommunications, and in general the development of various innovative technologies and overall human production and service activities. The advancement of commercial logistics is leading to the increasing adoption and incorporation of certain technologies and

innovative solutions from the commercial sector into military logistics, that is, to greater integration of commercial logistics into the military logistics system.

In the 1990s, commercial logistics, or its close synonym, supply chain management, underwent fundamental changes that already have a profound impact on public sector logistics, including military logistics. This is primarily related to the outsourcing of certain public services to private or other agency companies. This concept of resource relocation is known as outsourcing. Outsourcing involves the transfer of management, functions or services to an external service provider through a contractual agreement, whether private to public sector companies or public to private sector companies (Perlo-Freeman & Sköns, 2008).

There is a general assumption that private companies (agencies) provide services more cheaply and more efficiently than government (state) agencies. Implementation of the outsourcing concept in both the private and public sectors is thought to bring cost savings, quality improvement, faster access to new knowledge, expertise and skills and better risk management, as well as greater flexibility and delivery of products and services on time. Military outsourcing is part of this trend (Jackson, 2012).

The transfer of certain military functions to the private industry is part of a broader trend of public sector privatization in many countries. In the last three decades, the private military services industry has grown significantly. Companies that specialize in providing military services are often referred to as private military companies, and many of them are part of larger multinational corporations (Erbel & Kinsey, 2015).

More recently, in most developed market economies, the private military services industry has been on the rise due to the increasing commercialization and gradual privatization of state-owned enterprises engaged in the production, transportation, maintenance and management of weapons and military equipment, or the commercialization and privatization of organizations that previously performed a wider range of logistical functions within the military or the Ministry of Defense (Moore, 2017). The increase in the number of military outsourcing companies is explained by the effect of the post-Cold War restructuring of the armed forces in the late 20th century, which later expanded significantly by using private contractors to supply military services that concentrated and specialized the knowledge and capabilities of discharged defense personnel.

The literature cites two key trends that have led to the growth of the military logistics services industry, that is, affecting both demand (the use of private military service companies) and supply (the rise of private military service companies). In terms of supply, the reduction in military spending and the dismissal of military personnel after the end of the Cold War created an excess supply of specialized personnel to provide these types of services. On the other hand, changes in military technology, limited capabilities of the military logistics system, and the loss of military expertise due to layoffs have led to demand for services from outside suppliers (Jackson, 2012).

With this logistics concept, it is possible to reduce logistical and other support forces, thereby ensuring the involvement of more soldiers who are able to become involved in the operational activities of the military. In addition, changes in military technology that revolutionized weapons and military systems are leading to increasingly complex technical requirements for the maintenance and operation of military-technical systems, and often require additional technical expertise available from suppliers. Thus, the increased use of high technology in NGOs also means greater dependence on commercial technology and greater involvement of private companies in the lifecycle management of military technical systems.

By outsourcing the private sector, contracting and procurement of non-typical logistics and other non-military activities can help increase the so-called tooth-tail relationships (McGrath, 2007).

In general, the development of commercial logistics is ahead of the development of military logistics, and there are few armies in the world that can keep up with this trend. In recent years, considerable funding has been allocated to finance the research and development of logistics innovation in the commercial sector. Civil logistics companies, led by digitization and globalization, develop and implement in business practices new technologies, processes and methods, such as: green technologies, artificial intelligence, robotics and unmanned (unpowered) systems, additive manufacturing (such as 3D and 4D printing)), etc. These innovative developments also allow the armed forces to modernize their logistics support and improve the functioning of their logistics system, for example: additive manufacturing offers new ways to align (reduce inventory levels) supply chains and accelerate the delivery time of spare parts, which is essential for maintenance of weapons and military equipment.

In general, both military and business logistics seek to integrate all their activities into a single system organized in such a way as to

accomplish its tasks as effectively and efficiently as possible and provide complete, timely and high quality support, with as little cost and loss as possible. The goals and tasks dictate the types and structure of activities that take place in the logistics system, because the complete logistics support provided is the most important part of any logistics system. In order to achieve this, all activities, processes and functions in the logistics system must be designed in such a way as to realistically support the structure and level of customer requirements, as users most often view logistics as a system that meets their needs (requirements) for certain material, services, works, energy, etc., to a certain place, at a certain time and under certain conditions.

In principle, military and civilian logistics activities can be divided and classified in a number of different ways, and most often they are grouped according to functional areas. In civilian logistics, the number of functions performed by the logistics system may be smaller, while some functions may be larger in scope than those occurring in military logistics, but military logistics is, in that sense, most complete in the functional areas and tasks it performs.

It should be noted that military logistics deals with a wider range of activities than business logistics, as it is responsible for meeting all the needs of the military in all conditions of their engagement. Military logistics is required, in addition to the ability to provide effective and efficient support, to possess the ability to perform concurrent combat operations in order to prevent the enemy from intent.

Military logistics differs from business (civilian) logistics in that its activities have never been an end in itself, unlike business (civilian) logistics where profit plays a significant role and tends to minimize costs and maximize economic profit. Military logistics aims to create all the necessary conditions and provide maximum support to military forces in order to successfully complete an assigned task, which can be far more important than making a profit. Thus, military logistics must have the robustness of its system and the optimal redundancy of resources to achieve its goal, as opposed to business (civilian) logistics that seeks lean and agile business approaches, namely the concepts of anticipatory logistics, just-in-time (JIT) and third-party logistics (Beaumont, 2017).

The role and importance of national and humanitarian logistics and their impact on military logistics

In the developed armies, there is a growing trend of integrating military logistics into the national infrastructure, production and service

economic base of the state. In military logistics, an effective and efficient linking of the military and civilian sectors is a particular problem in order to prepare and realize the supply (procurement) of material, to provide labor and any other support of the national economy to the efforts of the armed and, generally, security forces. From a military point of view, logistics is not only a set of activities that enable the delivery of combat equipment, equipment and materials and the provision of services to the military during the war, it also includes the ability of national infrastructure, production and service bases to equip, support and supply peacekeeping forces, and to enable the movement of the armed forces through the national transport system, as well as the ability to supply and maintain those forces when they are already deployed in the zone of operational use (Stanojević et al, 2017a).

Military logistics is complex, diverse and requires the use of modern technology and modern management, but also maintaining security and high quality of materials, services, information and energy flows. Therefore, it is very important to consider national logistics when considering military logistics, because military logistics has its stronghold in the national economy and logistics.

National logistics is the process of planning and providing goods and services to support national military forces and their operations, the national economy and its international obligations and requirements. National logistics is determined by the potential of the state, namely resources, knowledge and infrastructure, as well as the operationalization of the exploitation of those resources, knowledge and infrastructure, which is the economy of a country. That is why the economic resources, knowledge and education of a country are the most reliable and significant logistics base of defense, that is, the educational system, technological and economic development and economic system of the country are the basis of national logistics (Stanojević et al, 2017b). The Armed Forces are the main user of national logistics services and thus its most important customer. Therefore, national logistics is closely linked to the technological and economic development of the country, which ultimately depends on the size and equipment of the armed forces, that is, their ability and willingness to defend national interests and wage war.

National and military logistics are in the function of achieving the set national goals, which are achieved by the integration of all elements of national power: political, psychological, economic and military elements. Logistics borders on strategy (operations) and tactics and operates in an environment driven by national goals and policies. In doing so, the socio-

economic and political factors have a primary impact. The strategy creates plans for achieving the goals, and logistics provides the means to materialize those plans. The roots of logistics are in the national economy, where the influence of civilian authorities is dominant. The basic criterion is the ability to produce, while for the military element of national power it is important that the end product of logistics lies in combat operations. National logistics contributes to the establishment, equipping and support of the military and its role in the implementation of national policy and military strategy. The priority objective of military logistics is to achieve national security through the provision of the necessary weapons systems and military equipment, with defined reliability, suitability for handling and maintenance and the required tactical and technical characteristics (Stanojević et al, 2017a).

In addition to the logistics approaches outlined above, it should be borne in mind that logistics also play a very important role in emergency response and disaster relief operations, which has given rise to the concept of humanitarian logistics.

Humanitarian or emergency logistics is a term used to denote certain logistics activities that are necessary to assist victims of numerous natural and technical and technological and other disasters (industrial accidents, earthquakes, floods, environmental accidents, epidemics, large scale fires, economic problems and migration of the population caused by them, major acts of terrorism, etc.), as well as in emergencies, such as plane and traffic accidents, shipwrecks, fires, etc.

Humanitarian or emergency response logistics has recently received special attention in the literature, and has become very important and challenging to study by many practitioners and researchers. It is challenging because each case is different, and as a result, very few tasks are routine. In the humanitarian and emergency processes, logistics plays a central role in all activities of the process of mobilizing people and material resources in the area of disasters and disasters. It aims to provide assistance in the form of medicine, water, food and shelter, as well as in the evacuation and rescue of material resources, thus distinguishing it from the traditional logistics process (Kovács & Spens, 2007).

Humanitarian logistics requires a high level of coordination and management as it integrates the activities of numerous government organizations, military and police forces, humanitarian agencies, donors, NGOs, as well as private sector companies and specialized providers to provide emergency logistics services (Heaslip & Barber, 2016).

Due to their specific activities, military and humanitarian logistics are often analyzed from the standpoint of non-profit and efficient operations. The literature has identified many aspects of humanitarian logistics that can be applied from military and commercial logistics, including decision-making, cooperation and coordination, and vice versa. There are numerous studies identifying critical aspects of humanitarian supply chains and their capabilities and limitations, as well as numerous ways to improve logistics processes and services, including information flow and performance measurements. Also, a number of models have been developed to improve various aspects of humanitarian logistics, including inventory management and inventory pre-positioning, facility location and sizing of transportation capabilities, which can be applied in military logistics (Heaslip & Barber, 2016).

Often, the term military and humanitarian logistics also includes all logistics activities that also occur in civilian logistics, with the emphasis not on earning profits and reducing logistics costs (the principle of effectiveness) but on the ability of the logistics system to provide effective support (principle of efficiency). The principle of efficiency leads to the redundancy of resources and the robustness of the logistics system to provide secure support. Therefore, the key principle of functioning of military and humanitarian logistics is efficiency, while the key principle of functioning of business logistics is effectiveness.

The efficiency and effectiveness of the functioning of military and humanitarian logistics cannot be tested in the market, unlike commercial logistics, but only by comparative analysis. The particular complexity and specificity of military and humanitarian logistics systems is that they are designed and developed in peace for successful operation in different future war and crisis conditions. Experiences from previous wars and crises are not reliable, as each war and each crisis has its own peculiarities, and war games and crisis simulations, as the basic tools used in studying future events, produce results in strictly defined and limited conditions. For this reason, special attention should be paid to measuring the performance of military and humanitarian logistics systems.

Approaches in logistics personnel education

The education of logistics professionals has always been of the utmost importance given the place, role and importance of logistics in the defense, business and commercial sectors.

Logistics is nowadays taught in many colleges and universities, through numerous courses in academic and vocational studies. In addition, the acquisition of the necessary logistical knowledge and skills is also achieved through various courses organized and implemented within many business and professional associations, scientific, educational and research institutions.

Education of logistic personnel potential represents the development of the most significant resource of the logistics system. The required qualifications of logistics personnel are most often conditioned by the complexity of the structure, the manner in which weapons and military equipment are used and maintained, and thus directly influence the development of other factors of military capabilities.

Qualifications of logistics personnel, on the one hand, should be directed towards generalization and training for solving global logistical problems, and on the other hand, towards specialization and acquiring expert-specialist knowledge for solving narrowly professional problems (Andrejić et al, 2016).

When designing a logistics system, the sizing of its personnel potential in all aspects must be properly done. However, in practice, it often happens that the logistical staffing potential is under-sized by both number and expertise. In addition, it is often the case that persons holding other qualifications are assigned to the formation sites for which one qualification is intended. Even when it has human resources that are adequate both in number and in the required knowledge and skills, it must be properly targeted in order to achieve effective and efficient logistical support, which is achieved through proper and continuing education and training.

Since logistical processes, due to great dynamism and heterogeneity of their occurrences, cannot be completely and easily formalized and automated, the staff that performs tasks in all areas of logistics not only loses meaning, but the effectiveness and efficiency of the logistics system actually depends on creativity, organizational skills and innovation of logistics personnel. In addition, the importance of personnel logistical potential can be seen in the personnel structure of modern armies, where the ratio of the number of non-combatant and combat personnel ranges from 3: 1 to 7: 1 in favor of non-combatant, and the proportion of non-combatant logistics personnel is about 80% (McGrath, 2007).

Academic logistics study approaches

There are numerous approaches to the study of logistics and the training of logistics personnel in theory and practice. Logistics is most often viewed and studied from the point of view of economic (business-cost), engineering (technical-technological) and managerial organizational-management) aspect (Niine & Koppel, 2015).

Observing and studying logistics from an economic point of view relates primarily to the cost system generated by logistics processes and activities within a business system (enterprise, company) or a defense system, but also to the application of economic principles in the operation of the logistics system in both for-profit and non-profit organizations. This view of logistics is dominant in the field of business (commercial) logistics, which is understandable from the point of view of business operations of companies aimed at minimizing logistics costs and maximizing profit, as well as in the way of utilizing logistics personnel potential in differentiating logistics performance and creating competitive advantages (Fugate et al, 2011).

The economic approach of logistics and its phenomena is primarily studied in the study programs called Business logistics.

The engineering angle of observing and studying logistics depends on the system being observed, that is, whether it is an organizational or technical system, but it essentially boils down to:

- application of engineering principles, concepts and tools for the design and construction of the logistics system through spatial, organizational and technical-technological aspects, that is, when designing a "logistics network" (solving location-allocation problems, designing the structure and capacity of logistics elements, etc.);
- application of logistical principles, concepts and tools in the design of a technical system (tool) with all supporting elements for its support throughout its entire life, which is achieved by the "integrated logistical support" approach;
- defining, designing and applying control mechanisms (methods, techniques and tools) that are specific to managing logistic processes and activities in organizational systems, that is, the lifetime of a technical system, based on engineering principles, mathematical methods and information technologies.

This approach is inherent in "logistical information systems", which have recently been intensively developed under the name of ERP and PLM.

The engineering approach to logistics is evident in the design and construction of the technical part of the logistics system (transportation

technologies, warehouse technologies, materials handling technologies, production and service facilities, information and telecommunication technologies - logistical information systems, etc.), as well as in the logistics flows when designing products and the provision of services (flows of materials, services, information, energy, capital, etc.), and especially in the development, production, use, maintenance and disposal of complex technical systems.

The engineering approach to the study of logistics is a characteristic of the so-called The "German School of Logistics", where it is mainly taught at technical colleges called Technical Logistics. The term "technical logistics" does not appear in English-speaking areas, but usually uses the term engineering logistics at the faculties where it is taught. Although the two terms (technical and engineering logistics) can also be seen as synonymous, the descriptions of engineering logistics emphasize that logistics uses scientific principles, mathematical methods and information technology as fundamental tools for designing logistics chains and networks, designing and managing logistics systems. The descriptions of technical logistics emphasize the application of different technologies in logistics processes (transport technologies, warehousing technologies, materials handling technologies, production and service facilities, telecommunication technologies, etc.).

The engineering approach to logistics is reflected in the application of the principles and concepts required to ensure the effective and cost-effective support of the technical system (means) throughout the programmed life cycle. The asset life cycle begins with the identification of user needs, extends to the planning stages of research, design and development, testing and evaluation, production, use, maintenance and, finally, expenditures and withdrawals from operational use. This approach is known as "Integrated Logistic Support".

Studying logistics in the domain of managerial aspect is also very important, because managerial knowledge and skills enable organization and technology of work, ie. activities and processes in the logistics sector to be planed, organized, led, controled and executed rationally, based on scientifically based expertise and capabilities, as well as with the application of modern information technologies and management information systems. A key aspect of the study of logistics from a managerial perspective is related to the management of logistics processes, that is, approaches to decision-making at various levels of organization of the logistics system. This knowledge is acquired through courses called Logistics Management and Supply Chain Management.

Approaches in education of military logisticians

Military logistics, due to its multidisciplinary nature, requires a very heterogeneous and highly skilled personnel potential of an appropriate educational profile, which must be sufficiently qualified and capable of implementing a wide range of logistics support activities. Therefore, human resources emerge as the most important element of the logistics system through which the basic preconditions for successful functioning of logistics are created. The staffing potential of logistics must be satisfactory from the point of view of both quantitative and qualitative aspect, that is, the logistical staff must be sufficiently and properly designed in numbers, and must have adequate qualifications, knowledge and skills to perform its functional tasks.

Numerous world defense universities and military academies train logistics officers in academic studies and career training. The training of military logisticians is ensured through the implementation of modern curricula, quality teaching staff and the application of a modern teaching material base. Training concepts, defining personnel profiles, plans and programs for education and training are subject to constant review and upgrading to the needs of logistical concepts and principles, as well as the specifics of military activity, which must be consistent with the doctrine of use of military forces, as well as with the requirements of high technological development of weapons and military equipment.

Military logistics professionals must possess the necessary theoretical and practical knowledge of all the necessary engineering, managerial and military disciplines, knowledge and ability to understand both the economic and social laws that govern them, as well as specific skills in the application of technology and logistics process management in various fields of activity.

Military logistics personnel are also required to possess certain leadership skills and qualities reflected through self-discipline, initiative, trust, sacrifice and intelligence. In addition, military logisticians must have knowledge of the application of general international and national laws and standards, as well as standards related to specific areas such as quality, environmental protection, health and safety of employees, safe food production, information security, etc. . Logistics staff are also required to be physically and mentally capable of performing under physical and mental pressure, to make quick decisions and to focus on successful completion of tasks, and to show respect for their subordinates and others.

In general, the education of officer personnel is of strategic importance, because it is through the education and training system that the state creates the longest-lasting impact on the defense system. Professional officer staff retains about 30 years in the military, and training a generation of officers in basic academic studies at numerous military academies and defense universities in the world lasts from 4 to 5 years, which is characteristic of each country individually, depending on the achievement, the level of development of the state and the higher education system in their society, but also on the tradition in the armed forces themselves and the directions of their development.

In relation to the problem of the expertise profile of logistics officers in the world, there are different points of view where they prefer two concepts: a broad (generalist) or narrow (specialist) profile of logistics officers. Generally, technical, technological and engineering knowledge in the fields of mechanical engineering, electrical engineering and electronics, computer science, chemistry, materials technology, traffic and transportation, as well as logistics engineering is preferred in the education of officers of technical, traffic and intendant services. While the multifunctional logistics officer is obtained at the second level of education through career forms of advanced training, master's and specialist academic studies. This approach to the training of logistics personnel arises, first of all, because of the speed of changes in technical and technological achievements, but also because of the need to perform specific formative duties.

It is important to emphasize that any systemic change in education must be preceded by a thorough analysis of the qualitative advantages and disadvantages of the education system, as well as the acquired competences and experiences. A different approach leads to failures with enormous adverse consequences. Of course, the curricula must be continuously updated in line with the development of military thought, weapons and military equipment, as well as technical, technological and scientific-educational achievements in civilian life. In the event of a failure in the training of logistics specialty officers, especially in basic academic studies, the consequences are difficult to eliminate, since a sample of 4 to 5 generations (classes) of officers is required to evaluate the quality of the education system and curricula. It turns out that the cycle of 10 to 12 years is the shortest period that provides indicators valid enough for undertaking systemic changes in education, which is a very long period for correcting any errors.

Conclusion

Current facts indicate that defense logistics systems, under present conditions, must be more flexible, adaptable and resilient than in the previous period, mainly due to the existing and expected technical and technological impacts whose effects are evident in all functional areas of logistics.

The main tendencies in the development of military logistics are directed towards the creation of an efficient, effective, flexible and interoperable logistics support system, capable enough to respond promptly and adequately to all requirements of the military forces, regardless of possible changes in the operational environment that most often have a negative impact on the capabilities of the logistics system. Therefore, the process of logistics support planning, which creates the basic preconditions for the efficient functioning of the logistical support system in providing a complete and fast response to the generated requests is a key process in the work of the logistics authority.

In today's environment, the development of business logistics is faster than military logistics, and increasingly different technologies and innovative solutions from commercial logistics are being taken over and incorporated into military logistics. While some logistics requirements are uniquely military, many technologies and processes for military logistics can be taken from commercial logistics. In addition, the increased involvement of the private sector in providing military logistics activities was clearly emphasized.

The above facts indicate that logistical problems must be approached with special care, highly professionally and with extreme responsibility. Military logisticians need to be well versed in various definitions of logistics concepts and numerous practical solutions that come from the commercial sector. This is especially important in view of the fact that certain solutions that give very good results in business (commercial) logistics are not always adequately applicable in military logistics. This needs to be taken well into account and cautiously implemented, as they can have long-term negative consequences for the defense system as a whole. However, innovative solutions present in civilian logistics should certainly be considered to improve certain military logistics activities, as they can reduce costs and improve the functioning of the military logistics system.

The logistics support of military forces in modern conditions of engagement requires a new approach to building a sustainable logistics system, capable enough of adapting to new challenges and of supporting

various goals and missions of the forces engaged in all conditions. Therefore, when performing operations, commanders require a logistic system which is flexible, dynamic and robust enough to provide necessary resources when they are needed, where they are needed, to the right extent and in the required manner, that is, a reliable and rapid logistic response to the operational requirements of the engaged power.

Numerous specifics of military activities and the conditions under which logistics support is realized require that military logisticians always have to go beyond the requirements of the user, to take forward the organizational units they manage and command as well as to adapt to the challenges in an ever-changing environment. They must also be able to make decisions independently and bear the ultimate moral responsibility for such decisions, as well as to know the normative-legal frameworks in which they should function and on the basis of which they should regulate their areas of activity.

It can be argued with great certainty that the success of the engagement forces in operations depends, to a large extent, on the ability of the logistics authority to process a large amount of information in a very short time and make quality decisions about meeting the needs of the engaged forces and the rational use of logistics resources, that is, to look at user's requirements and determine the capability of the logistics system. Therefore, the logistical staff is required to possess certain leadership skills in addition to general and specific knowledge in various fields of engineering, economic, managerial and military disciplines.

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РОЛЬ, ЗНАЧИМОСТЬ И МЕТОДЫ ИЗУЧЕНИЯ ЛОГИСТИКИ

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Резюме:

Введение/цель: В статье представлено развитие логистики как особой области военной отрасли, области современного ведения бизнеса и научной дисциплины, которая вдохновляет многих исследователей, теоретиков и практиков подходить к логистическим проблемам с разных сторон. Сущность логистики заключается в комплексном подходе ко всем составляющим ее видам деятельности, благодаря чему снижаются затраты и повышается эффективность логистической системы в поддержке основных видов деятельности организации или технической системы. В связи с интенсивным и многоплановым развитием логистики и ее применения в различных областях, потребность в высококвалифицированных специалистах по логистике со специальными знаниями и навыками, необходимых для выполнения широкого спектра деятельности в системе логистики становится все более выраженной.

Методы: На основании описания военной, деловой, национальной и гуманитарной логистики и результатов сравнительного анализа была выявлена их взаимосвязь.

Результаты: На основании проведенного анализа была объяснена значимость изучения логистики как междисциплинарной науки и было указыно на необходимость специальной подготовки персонала логистики.

Выводы: Логистика интенсивно развивается в различных областях в зависимости от целей системы (организационной и технической), которую она поддерживает. В целом, коммерческая логистика развивается быстрее, чем военная логистика, но и в военной логистике используются многие инновационные коммерческие логистические решения. Однако некоторые решения, которые дают хорошие результаты в коммерческом секторе, не дают соответствующих результатов в системе вооруженных сил. Поэтому необходимо проводить исследования и изучать функционирование

логистических систем в различных областях и тщательно интегрировать индивидуальные решения в систему военной логистики. Как самая сложная система логистики, военная логистика требует привлечения специального персонала и специальной подготовки специалистов по логистике.

Ключевые слова: логистика, военная логистика, бизнес-логистика, логистические системы, логистическая поддержка, интегрированная логистическая поддержка, образование, логистический персонал.

УЛОГА, ЗНАЧАЈ И ПРИСТУПИ ИЗУЧАВАЊУ ЛОГИСТИКЕ

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ОБЛАСТ: логистика
ВРСТА ЧЛАНКА: прегледни рад
ЈЕЗИК ЧЛАНКА: енглески

Сажетак:

Увод/сврха: У раду је приказан развој логистике, као специфичне области војне делатности, савремене области пословања и научне дисциплине, који инспирише многе истраживаче, теоретичаре и практичаре да логистичким проблемима прилазе са различитих аспеката. Суштина логистике је у интегрисаном приступу свим њеним саставним активностима, чиме се смањују трошкови и повећава ефикасност и ефективност логистичког система у пружању подршке основној делатности посматране организације, односно техничког система. Због интензивног и мултидимензионалног развоја логистике и њене примене у различитим областима, све чешће се јавља потреба за високообразовним логистичким кадровима са специјализованим знањима за обављање широког спектра делатности у логистичком систему.
Методе: На основу дескрипције војне, пословне, националне и хуманитарне логистике и компаративне анализе приказан је њихов међусобни однос.
Резултати: На основу извршене анализе објашњен је значај изучавања логистике као мултидисциплинарне науке и указано на потребу за специфичним образовањем логистичког кадра.

Закључак: Логистика се интензивно развија у различитим областима у зависности од циљева система (организационих и техничких) које подржава. Генерално, комерцијална логистика се брже развија у односу на војну логистику, а многа иновативна решења комерцијалне логистике налазе примену у војној логистици. Међутим, одређена решења која дају добре резултате у комерцијалном сектору не дају адекватне резултате у војсци. Због тога је неопходно вршити истраживања и проучавања функционисања логистичких система у различитим областима и поједина решења пажљиво уграђивати у војни логистички систем. Као најкомплекснији логистички систем, војна логистика захтева специфичан кадар и начин образовања логистичких стручњака.

Кључне речи: логистика, војна логистика, пословна логистика, логистички систем, логистичка подршка, интегрисана логистичка подршка, образовање, логистичко особље.

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