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RESEARCH PAPER

Military Logistics vs. Business Logistics: A Comparative Analysis

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ABSTRACT

Military logistics as a specific area of logistics management makes the difference between a well-supplied and self-sustainable army which due to an efficiently created supply chain, can perform it's military actions more efficiently, and an army that, due to insufficient commitment to military logistics activities creates an inefficient army that is cut off from food, water, and other basic resources without which the army can't function. Military logistics implies a complex system, formally separate, but essentially very close to business logistics.

The aim of this review paper is to point out the features that distinguish military logistics management from business logistics management, but also to point out the complexities and limitations that military logistics brings with it. The methodology used for pointing out the above-mentioned goals will be literature review and comparative analysis. The key determinants of the difference will be presented through the organization of the logistics supply chain, the subjects, participants and goals it involves, but also the risk, the corresponding law, logistics process management approach, innovations, organization systems, and the basic methods of transportation that military logistics brings with it. The given specifics need to be analyzed and compared with the key features of business logistics, where through the examples from practice will be pointed out the points of contact, but also the key differences between these two areas of logistics. The results of the analysis show that specifics of military logistics make this branch of logistics special, formally separated, but essentially very close to the area of business logistics.

Key words: *Military logistics, business logistics, defense system, comparative analysis*

JEL Classification: M20, M21, M29

INTRODUCTION

Efficient management of military logistics, as one of the main features of a well-organized military organization, has determined the difference between successful and unsuccessful military campaigns in the history of military theory. Each adequately organized army paid equal attention to the military strategy and the methods of combat, as well as to military logistics and efficient ways of supplying the army. Poor organization of military supply chains has often been one of the key factors in the collapse of the entities and states represented by the military.

Military logistics as a specific area of logistic management makes the difference between a well-supplied and self-sustaining army which due to an efficiently created supply chain, can

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perform it's military actions more efficiently and an army that, due to insufficient commitment to military logistics activities creates an inefficient army that is cut off from food, water, and other basic resources without which the army can't function. However, even the recurring history that regularly reminded military leaders of the importance of logistics did not contribute to its more detailed research until the beginning of World War II, when for the first time serious resources and research were directed towards military logistics.

Since the topic of military logistics is usually studied in military circles, there are not so many papers that analyze the relationship between business and military logistics. Papers that do research the connection between these two logistics branches usually explore specific areas of military logistics such as thought leaders, the theory of reasoned action analyzed on the examples of military logistics officers, etc. Military secrecy (confidentiality), as will be stated later in the paper, prevents in-detailed and extensive research on this topic.

The basic research hypothesis tested within this paper, which is of review nature, is:

> H_1: The specifics of military logistics make this branch of logistics special, formally separated, but essentially very close to the area of business logistics.

The methodology used for testing H_1 is focused on literature review and comparative analysis. Following the research hypothesis, the first and second part of the paper deal with the theoretical aspect (concept and significance) of military and business logistics, as well as its key principles. Assuming that one of the basic goals of both military and business logistics is the efficient organization of its key subsystems: transport, warehousing, inventory, procurement and logistics information system, within the third part of the paper a comparative analysis of the management organization of these two specific areas of logistics is performed.

MILITARY LOGISTICS: CONCEPT AND SIGNIFICANCE

Military logistics has many definitions. They can usually be found in national defense strategies or military manuals. The most precise definitions are usually made by the Military Academies. However, each army has certain activities that it considers part of its military logistics, while other countries have some specifics of their own. An additional problem in defining is the institution of military secrecy (confidentiality) which prevents academic research in certain fields, as no army fully reveals its way of organizing to the public.

As there are no historical sources that definitively determine the origin of the word logistics, it is considered that the word logistics originated from the Greek *logos,* which primarily means account (Tepić et al., 2011). We find a similar problem in the term military logistics, which was not treated as a separate discipline in relation to business logistics, and therefore as a term it was used exclusively in military circles. The mission of military logistics implies the delivery of all necessary military materials and information to bases, battlefields, or other key military points such as military ports, stations, friendly lines (Stanojević et al., 2018). In addition to delivery, military logistics also deals with the analysis of demand based on inputs delivered by logistics officers in the field, the acquisition of required resources, and only then the distribution that is followed by maintenance. So, every military logistics must, first of all, give an answer to the question of what the army needs, then how to get there and only then how to deliver what is required.

The Serbian Army defines military logistics in Article 45 of the Law on Defense, where "the logistical support of the Serbian Army is realized in the function of meeting its needs in the following activities:

1. Production, modernization, and maintenance of weapons and military equipment;
2. Supply of weapons, military equipment and other resources;
3. General logistics needs;

4. Planning, construction, and maintenance of infrastructure facilities;
5. Transportation of people and resources;
6. Health protection, safety and health at work protection, veterinary protection, environmental protection, fire and explosion protection and other types of protection. "(Službeni Glasnik RS, 2018)

As it can be seen, the very concept of military logistics is broader than business logistics, because military logistics in addition to transport and storage includes many other activities such as medical health activities, maintenance of critical military infrastructure, transport of specific materials and equipment, but also veterinary protection and activities military logistics in humanitarian disasters, pandemics (example of using the army for civilian purposes due to the COVID-19 pandemic), etc.

An interesting part of military logistics that is usually neglected are the so-called internal relocations of soldiers and their families. Due to their specific activities, military personnel often moves, and behind such a complex task there are even more complex logistical activities. According to the U.S. Department of Defense, over $1.7 billion is invested annually to transport over 600,000 units of equipment during internal relocations alone (Solis, 2003).

Due to the wide range of logistics activities, the cooperation of logistics and non-logistics staff is of key importance, given that logistics activities have a strong impact on the operational part of the army. As the military operating practices observed a decline in the quality of performance of duties due to poor communication between logistics and non-logistics staff, which usually leads to a misunderstanding of the function of logistics officers, military science has been devoted to ways of improving relations between the two branches of the military which must intensively cooperate in order to achieve an optimal result (Andrejić et al., 2011). A retired Army General of the United States, Denis Reimer points out that "there can't be a revolution in military affairs without a revolution in military logistics" (Anderson et al., 2007), as military logistics entails the full efficiency of the operational part of the army.

Traditionally, logistics analysts have always viewed certain military logistics activities separately from the transport itself, such as the activities of maintenance and repair of equipment, or the methods of organizing storages and bases (Zeimpekis et al., 2015). Regardless, the development and improvement of military logistics itself have always been integrated, i.e. although certain activities were observed and researched separately, they were viewed as part of a complex and integrated unity as most if the military logistics activities are multidisciplinary and multifunctional (Juskowiak et al., 2004). One of the best examples of the impact of military-logistical maintenance activity on the efficiency of the operational part of the army is the fact that doubling the maintenance of an F-16 fighter aircraft provides a 70% increase in flights (Andrejić et al., 2009). This data provides insight into the potential of increasing the combat readiness of an army by increasing logistics capacities.

As it can be seen, the importance of military logistics stems from the needs of military personnel and equipment. The two key resources that the military must have at all times are fuel and ammunition (Bates, 2003). Tanks without fuel will not move, a soldier without food will be no more than a pile of meat with a rifle, and a base without electricity will be a traditional Roman tent that cannot survive in the conditions of modern warfare. Of course, logistics alone cannot win the war, but in combination with strategic and operational military management, logistics is becoming the main driving force of military operations.

Development of military logistics

Although the notion of logistics is of more modern date, military logistics has been the subject of study for thousands of years. It was first perfected by the Greeks during the reign of Alexander the Great. His empire has suffered from the problem of Overextension from which all large empires have suffered. Namely, this problem occurs when the territory of the empire is so

vast and wide that it is almost impossible in a military sense (but also in the economic and administrative sense) to supply every critical point of the empire.

Alexander's empire stretched from modern Macedonia in the west, all the way to the area that is today known as India in the east. One part extended to modern-day Egypt as well, which was a key food supply point for Alexander's troops. Given that the key food center was Egypt in the South, the center of recruitment in the West (mercenaries, Greeks, Macedonians and Balkan tribes), the expansion of the empire created the need to develop military logistics and supply chain that provided routes of key resources and recruits that enabled Alexander's long-term state of war and the conquest of the most remote territories. After the collapse of the empire of Alexander the Great, the basics of military logistics have been written down and kept as the strictest war and state secret and were inherited by the Romans.

The Romans were the first to perfect specialized logistics channels, and perfect them with modern ways of supplying food and water. They were the first to create military warehouses and military bases, which included key supply points and logistics operations. It is precisely the strategically placed bases that eliminate the effect of overextension, and this organization of logistical activities enabled the Romans to be a self-sustaining army, from which the long-standing status of a great power arose.

However, the development of logistics after the fall of the Roman Empire was doomed to centuries of use of outdated methods of storage and transport. During the middle ages, most resources were invested in military strategy and weapon technology, completely neglecting the military logistics development. Mild signs of improved military logistics were seen in the 14th century, in the maritime warfare of the English army. Namely, England is one of the first countries to improve transportation by water, as the geographical position of the country is such that it requires a strong focus on the navy.

Problems arose not only when crossing the English Channel, but also on the return, because English soldiers had to have an efficient return after landing on the territories of Brittany, which in the case of warfare in the 14th century was very dangerous as they can take heavy fire while trying to cross the Channel. The English were the first nation to create specific logistic channels through water surfaces so they can reduce losses due to crossing the various water surfaces such as English Channel, both on arrival and on return which in most cases was more dangerous (Lambert, 2011). English military logistics were successful despite the difficult bureaucratization of the English (later British) Empire for three key reasons: 1) by the insular nature of Britain which gave the sea an important influence on branches of supply, 2) by the partnership of the state and the private sector, and 3) by the ideas and ethics that both united the state and gave its bureaucracy a special administrative culture (Morriss, 2011). It will be determined later that these three factors are crucial when it comes to developing the military logistics branch.

However, a glimmer of hope for military logistics appeared during the Napoleonic Wars. The very term logistics was the inspiration for the military rank of Logistics Officer (fr. *Maréchal des Logis*) in the French army, where this area is being formalized for the first time (Milovanović et al., 2009). These officers had the task of perfecting the logistical activities that enabled Napoleon to ignore the problem of overextension for many years (Komarek, 2019).

The further development of military logistics is reduced to the repetitive use of outdated methods from the time of the Napoleonic Wars, so the period of the 19th century was important in the military-logistical sense exclusively due to the development of the railway. Along with the development of the railway, strategies for sabotaging railway systems were being developed, which in relation to other means of transport of that century (steamships, riverboats, trucks) were more susceptible to attacks, and it was necessary to develop serious strategies for defending railways and wagons. (Hess Earl, 2017).

For the first time, serious investment in military logistics could be seen only in the Second World War. A little-known fact that most military strategists agree on is that the German army

lost World War II largely thanks to the logistical superiority that the Allies had. The Germans viewed logistics officers as part of an inferior military cadre and invested 80% of their resources in military technology, while the Allies invested vast resources in new and more modern logistics methods (Boog, 1982). This completely erroneous strategy was best seen during the Operation Barbarossa in 1941, when the German army invaded the Soviet Union.

Due to poorly organized military logistics (the German leadership put all its focus on the operational part of the army), the German army did not arrive in time to occupy the key point of military supply - Moscow. It did not succeed in Ukraine either (the key point of oil supply) or in the north during the siege of Leningrad (the key point of Norwegian oil supply). In addition, the supply lines of the German army were getting longer, the trucks were damaged due to poor infrastructure, and the consequence was the weak morale of the soldiers at the front. The extremely inaccessible terrain forced the German army to use traditional modes of transport which were inefficient in the conditions of modern warfare. The Soviet Leadership was aware of the weak investment of the German army in logistics capacities, and focused its activities on the sabotage of the railway, which at that time was the only developed distribution channel for the Germans. Precisely on this example, one can see the direct and indirect dependence of the operational part of the army on military-logistical activities.

On the other hand, the Soviet Union also had several diplomatic and natural allies. The natural allies were the climatic conditions (Russian winter) and the massive geographical area of the Soviet Union, which prevented efficient supply chains of the aggressor army. The diplomatic allies reflected through a number of military-logistics corridors aimed at supplying the Soviet Union with Allied forces, such as the extremely important but complex "Persian Corridor" (Leighton et al., 1995).

After World War II, all military theorists began a more detailed study of military logistics, which over time proved to be one of the key causes of lost wars. For the first time in the 1950s and 1960s, armies around the world introduced the concept of military logistics into their strategies, which is associated with the procurement, maintenance and transportation of military facilities, materials and personnel (Ballou, 2006). Due to the formation of block division and the Cold War, both hegemons (the USSR and the USA) begin serious investment in military logistics, development of critical and national infrastructure. The goal was to perfect the military logistics management so that the troops and their equipment are always ready in case of conflict with the other side (Milenkov, et al., 2015). Even the military strategy is elaborated in such a way that one of the key military activities involves cutting the enemy's supply chain and attacking the production and transport facilities of the other side.

Wars in the second half of the 20th century took place in the most remote places, such as the war for the Falkland Islands between Britain and Argentina. This conflict is specific because of the logistical problems that the British army encountered during the conflict. Due to the great distance and guerrilla warfare of Argentinian soldiers, the British army found itself facing a problem of mobility. Mobility is determined by “the comprehensive readiness of a nation’s transportation network, depots and ports to respond to the crisis within the time frame necessary”(Privratsky, 2014). Britain completely underestimated Argentina's readiness for war, and Britain's readiness to react (mobility) was extremely low, which led to major problems during operations in the Falkland Islands.

Through this brief historical overview, we can see the importance and the development of military logistics. Today, military logistics is the focus of every serious military force in the world, and serious investments are made in military logistics activities so that the operational part of the army always has the support and efficiently performs its tasks with the help of military logistics.

Key principles of military logistics

Principles in their original form imply certain rules that guide a certain discipline. Like any logistics, military logistics is based on several key principles such as prevision, integration, continuity, efficient response, and improvisation (Walden, 2006).

Prevision as a key principle of military logistics implies the identification, then the accumulation and maintenance of resources and information necessary for the smooth functioning of the army. Military logistics uses prevision (forecasting) as the basic way of identification, accumulation and maintenance, where, based on pre-determined parameters, it analyzes resources and information without which the army cannot function.

Integration implies the dependence of the operational (strategic) part on the logistical part of the army. This interdependence conditioned the integration of these two military areas as only integrated ones can bring the desired effects. Therefore, integration implies the cooperation of military logistics and strategy.

Continuity as a principle exists in every logistics area and implies the existence of a stable and regular military supply chain. The military supply chain is not a short-term one, nor does it exist *ad hoc* for the needs of a particular mission. Above all, it has continuity, i.e. it is permanent and functions as a continuous connection of different actors. An efficient response as a principle of military logistics implies efficient filling of gaps on the ground. In reality, it is a classic QR management system (Quick Response) which in military logistics has been developed with the help of various Military Information Systems such as LOGFAS-SDM developed by SAP, or GCSS-Army, LMP/PLM, and SALE systems.

Improvisation is a special principle of every logistics and implies the ability to adapt. Due to unknown factors and the state of war, military logistics must always be ready to improvise and adapt on the terrain. This type of improvisation implies constant innovation, which is necessary because there is no universally acceptable way of managing military logistics, nor is it possible to create it. This conclusion can be justified by the fact that no logistics work is done twice due to differences in the field, subjects, but also the essence of the logistics work that differs from case to case.

The given principles are closely connected and inseparable, so they can be viewed exclusively as a whole and as integrated key principles of military logistics. It is possible to analyze them separately and improve their activities, but it is necessary to take into account the integration and interdependence of the given principles during the analysis in order to create a comprehensive solution.

BUSINESS LOGISTICS: CONCEPT

There are numerous definitions of business logistics and there is no one universal definition used, both in practice and in academic research. Logistics as a dynamic, but also a new discipline is still evolving and the lack of universally achieved guidelines should come as no surprise.

Like military logistics and the supply chain, business logistics, and the supply chain represent the bloodstream of a company that carries out its activities behind a screen (Keegan et al., 2017). The first time the term business logistics was mentioned in its true form was in 1964 in the book of James L. Heskett "Business Logistics: Management of physical supply and distribution" (Heskett, 1964).

A comprehensive definition of business logistics has been provided by the Council of Supply Chain Management Professionals. For the Council, logistics management and supply chain management form two separate instances in which supply chain management forms a broader area defined as the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities, and collaboration with

channel partners (suppliers, intermediaries, third parties and consumers) whose main goal is to satisfy consumer demands (Vitasek, 2013).

Logistics management activities, on the other hand, by definition of the Council, "typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third-party logistics services providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning, and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and execution--strategic, operational and tactical. Logistics management is an integrating function, which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions including marketing, sales manufacturing, finance, and information technology" (Vitasek, 2013). As can be seen, logistics management is a narrower discipline than supply chain management itself and is the part of it that forms the foundation of any enterprise.

Confusion most often occurs when using these terms as synonyms where the term logistics is older, but also simpler than the term supply chain (Milovanović et al., 2011). The physical distribution itself is only one of the elements of logistics management, which includes many other activities besides physical distribution, where the difference is made exclusively between marketing logistics and physical distribution. The same situation is with supply chain management as logistics is only one part of the supply chain and as such, the supply chain is a broader concept than logistics management and supply chain management itself is the integration of all business activities from primary supplier to the final consumer (Cooper et all., 1997).

The best way to understand the difference is through the use of marketing analogies. It is impossible to put all marketing jobs under one organizational cap, usually the marketing organizational unit means promotional activities, but that does not mean that jobs like sales, market research, etc. do not fall under marketing activities (Aćimović, 2006).

Thus, marketing as an organizational function is not the same as marketing as a business philosophy of the company, and therefore logistics as an organizational function is not the same as the supply chain as the business philosophy of the company and the entire distribution channel, because it implies a broader concept than logistics activities (Aćimović, 2006).

Although the topic is controversial and there is no consensus among the professional and academic public, we will consider physical distribution management as a synonym related to logistics as an inseparable part of it, while we will view the supply chain as a broad term that includes logistics management.

Development and importance of business logistics

Globalization as a process of liberalization and increasing interdependence of the world has brought numerous changes in the XX and XXI century. The changes were felt in all spheres of business life, including the sphere of logistics activities. The interdependence of the world and the growing connection forced the companies to internationalize, which had to be accompanied by successfully organized logistics processes that would be able to deliver the desired product to consumers at the right time and in the right place.

Although primarily a military discipline, which formally separated from it only recently, it essentially had its own development and trends that it developed in parallel with the development of military logistics. However, deeper research of business logistics and the way in which it can increase the value and enable better competitiveness in the market of a company did not occur until the second half of the XX century. Under the influence of globalization, stronger internationalization and interdependence of the market, but also the increasing costs of

logistics activities, business logistics is beginning to be the subject of detailed research by the company's management.

The basic importance of business logistics is in creating added value for the company in order to become more competitive in the market. Namely, until the second half of the 20th century, companies improved their business in numerous ways in order to create value for consumers. Investing in the product itself or the production and technology was the most common one. In the specific case of investment in production, the basic idea stems from the fact that it is not wise to reduce production costs through low-quality substitutes or low-quality materials, but it is much more rational to invest in new technology or machine that can produce more products per hour and thus be more efficient in responding to product demand. A similar situation exists when we talk about improving the value of products through the improvement of the marketing branch. Through creating a brand, we influence the identification and creation of awareness about our product. Through the creation of special and special sales techniques, we influence the increase of trust, which enables us to sell more easily and efficiently.

It is in this form of innovation and value creation that comes at the end of the 20th century in logistics activities. The basic idea was to reduce costs while achieving the same or better quality. Logistics activities were unfairly neglected in this process because in that period the cost structure could not be better monitored, and thus determine that a huge part of the costs are actually borne by logistics processes and that we can reduce costs by more efficient management in logistics processes. Since paying more attention to innovation in logistics activities, many companies have succeeded, not only in their original intention to reduce costs but also in adding value to consumers through faster and more affordable deliveries around the world. Through numerous modern management models, the company's products and services become available to anyone at any time.

However, why have innovations in the field of logistics activities been so successful? There are a number of reasons, but it is certainly one of the key time savers. The man of the 20th and 21st century lives a dynamic and fast life. The Internet has taken communication to a much higher level, and many things are happening much faster than they would otherwise. Such technological innovations have created a man who considers time his most precious resource. Instead of traveling for a few hours to the warehouse to pick up the ordered construction material, usually by his own transport, he now has the option of having the same material delivered to his home, business or chosen address within a few hours. In that way, the entrepreneur becomes much more efficient, and numerous products whose availability was an unimaginable concept at the beginning of the 20th century now become available with one click. In addition, lower transport costs, but also better organization of logistics activities imply a lower price of logistics activities, and thus a lower price of products, which enables price competitiveness of products or services on the market and improvement of logistics capacities. Hence the importance of business logistics. As in any area of business management, the company strives to improve the efficiency of individual sectors. By improving the organization of the work of logistics activities, value is undoubtedly created for consumers.

MILITARY LOGISTICS VS. BUSINESS LOGISTICS: A COMPARATIVE ANALYSIS

Comparison factors

In order for the comparative method to be successful, it is necessary to define comparison criteria that have been singled out due to certain factors that make business or military logistics specific. Therefore, it is important to note that there are many specifics of both logistics and that we would go beyond the scope of this paper if we analyzed absolutely every part of the logistics process, either in military or business terms. During the analysis of the specifics, some key

criteria were singled out, which will serve as defined criteria for comparison. As comparison criteria we will define:

1. key activities, organization of flows, and goals of logistics activities,
2. logistics channels and key actors in logistics processes,
3. organization of transport activities,
4. risk and corresponding law,
5. logistics process management approaches,
6. innovations,
7. logistics organizational structures.

Comparative analysis

Comparison factor 1: key activities, organization of flows, and goals of logistics activities

The notion of business and military logistics is extremely important as a criterion of comparison of how certain similarities and differences can be drawn from the definitions themselves. In order to determine the degree of matching, it is necessary to break down the parts of the key business and military logistics activities, and thus determine the basic factors that make business and military logistics specific. Military logistics includes activities such as: 1) Production, modernization, and maintenance of weapons and military equipment; 2) Supply of weapons, military equipment and other resources; 3) General logistics needs; 4) Planning, construction, and maintenance of infrastructure facilities; 5) Transportation of people and resources; 6) Health protection, safety and health at work protection, veterinary protection, environmental protection, fire and explosion protection and other types of protection. On the other hand, business logistics includes activities such as: 1) Transportation management; 2) Warehouse management; 3) Inventory (stock) management; 4) Information management, and 5) Customer service management.

As noted, military logistics encompasses a wider range of activities than business logistics. Thus, we can state that joint activities of both types of logistics represent the transportation management, warehousing, inventory (stock) management, information management, and customer service management. Thus, the key activities of business logistics are inherent in military logistics as well.

Military logistics include additional activities that are specific exclusively due to the very subject of military-logistical activities, such as production, modernization and maintenance of weapons and military equipment. Specificity does not arise so much from the activities themselves (production, maintenance, modernization), but from the objects of the same (military equipment and weapons). Another specificity of military-logistics activities are planning, construction and maintenance of infrastructure facilities. The difference again arises not from the activities themselves (planning, construction and maintenance of infrastructure facilities), but from specific types of infrastructure facilities, such as critical infrastructure and national logistics systems. National logistics systems are a term that is mostly used in military logistics as they represent the logistics capacity of a country. They are also used in business terminology and represent the entire infrastructure capacity of a particular economic entity such as countries or economic unions. On the other hand, critical infrastructure is a term inherent in military logistics. In business logistics, there are more important and less important roads or warehouses that are extremely important for the logistics channel and whose loss would have a negative impact on logistics processes. However, in military logistics, the consequences of the loss of such types of critical infrastructure are much greater because the risk of loss includes broader activities, as will be explained later in the paper.

The third and key specificity of military logistics is reflected in the health and medical activities that business logistics simply do not know. Activities such as health care, safety and

health at work do not fall under business logistics activities. Finally, it can be stated that activities in support of environmental protection, veterinary, health care and other types of protection are activities specific to military systems as part of military activities during a state of emergency or the use of the army for civilian purposes. Business logistics also has an impact in the field of the environment (green supply chain and reverse logistics) but does not directly deal with the above mentioned activities. These similarities and differences can be shown in Table 1.

Table 1. Key Logistics activities of Military & Business Logistics

Key logistics activities	Military Logistics	Business Logistics
Transportation Management	✓	✓
Warehouse Management	✓	✓
Inventory (Stock) Management	✓	✓
Information Management	✓	✓
Customer Service Management	✓	✓
Production, modernization and maintenance of weapons and military equipment	✓	×
Planning, construction and maintenance of infrastructure facilities	✓	×
Health protection, safety and health at work protection, veterinary protection, environmental protection, fire and explosion protection and other types of protection	✓	×

Source: Authors

During the organization of military transport activities, special attention is paid to the organization of military logistics activities. Depending on the danger and the substance of the object of transport, a special method of transportation is chosen. This is how we distinguish the so-called controlled items such as money, mail, or precious metals, and sensitive items that may pose a danger to public safety such as weapons, ammunition, explosives, etc. (Haraburda, 2016).

The goals of military logistics in a narrower sense can be divided based on the *object* and *purpose* of military logistics. Purpose based goals include the creation of material, infrastructural and health conditions for life, work and execution of dedicated tasks of the Serbian Armed Forces, while object-based goals include only labour, production and services that need to meet individual and general needs of the defense system as whole (Andrejić et al., 2016).

If we look at the goals in a broader sense, it can be noted that both military and business logistics have the same goal - to satisfy the end-users (Customer Service Management). The difference is reflected in the fact that in the case of business logistics the final users are consumers (civilians), and in the case of military logistics the final user is the operational part of the army. In addition to this common goal, military logistics also has a specific goal in the form of supporting the operational part of the army in eliminating enemy forces. Therefore, military logistics does not achieve this goal directly, but indirectly through support to the operational part of the army. In addition to the given goals, it is necessary to analyze a separate marketing goal of logistics management, which must fulfill the so-called 5R concept (Five rights): 1) the right product, 2) in the right place, 3) at the right time, 4) in the right condition, and 5) by the right costs (Christmas et al., 2019). Finally, there is a clear similarity between the key activities between military and business logistics, where the differences are essentially reflected in the subject of their activities, which is becoming increasingly mixed given the growing influence of the private sector on military logistics activities.

Comparison factor 2: logistics channels and key actors in logistics processes

When we analyze logistics channels, we primarily analyze physical distribution channels, so the key difference between military and business logistics channels is of a marginal and terminological nature. Here one can see the importance of this comparison factor as the logistics channels and the actors form the pillar of any logistics process. Thus, both military and business channels include direct, indirect and flexible channels, because both combine the use of intermediaries. The only difference is that military terminology sees as an additional intermediary the military bases within which warehouses may or may not be located.

Thus, military warehouses can be the same as business ones, created separately for the purpose of storing and manipulating a certain good. Like business warehouses, military warehouses have specific warehouses that serve to store hazardous materials, specific products, etc. Strategic and operational bases are terms inherent in military logistics and business logistics does not know them, although there are similarities with distribution centers or the warehouses themselves, with the notion that military bases are far broader and more complicated than the warehouses and distribution centers. The use of bases enables the reduction of the costs of maintenance, transition, security operations, transport and deployment of the army as the supply chain itself is reduced and divided into several parts (Lostumbo et al., 2013).

During the organization of the logistics channels, various actors also appear. Actors inherent in business logistics are wholesalers, retailers and international intermediaries (sales agents, freight forwarders, 3PL and 4PL participants), while actors inherent in military logistics are private contractors, military bases, operational centers, checkpoints, logistics officers, and the State as the buyer, seller, manufacturer (dedicated state-owned enterprises), or State as a monitoring instance. It can be noted that the joint actors certainly represent the State (regulatory body), producers (outside the competence of the state) and warehouses as key intermediaries. Wholesalers and retailers also appear in military activities, but only as a source of supply (food, equipment, spare parts, semi-finished products) or a source of sales where the military industry can sell its products (weapons, ammunition, etc.) to retailers such as shooting ranges, weapons stores for civilian use, etc.

The military also trades internationally with other countries. However, this type of trade is specific, and it is under a special legal and organizational framework, as the arms trade is usually under the jurisdiction of the State itself. In conclusion, it can be noted that the logistics channels are identical, but that the key difference stems from the actors where the State plays the biggest role in military logistics activities, while in business logistics activities there are several actors that can have a dominant influence such as wholesalers or other intermediaries such as 3 PL and 4 PL providers, international freight forwarders, etc. The key intermediary that connects business and military logistics are private contractors which are the main entry point of private sector to the military sphere. Private contractors combine the private and military sectors in an efficient manner, and represent an instance that is slowly but surely taking over certain military activities, which in some cases include logistics operations.

Comparison factor 3: organization of transport activities

When it comes to organizing transport activities of necessary goods and information, business and military logistics use all transportation methods, with superpowers such as the United States and the Russian Federation most often using air traffic because of speed (O 'Hanlon, 2009), and therefore one of the key related activities of military strategy is to secure the airspace to keep the supply chain secure. This is especially evident in military logistics, which has specific services, which include, among other things, logistics services such as technical, quartermaster, medical, veterinary, traffic and construction services.

The key difference is reflected in the manner of physical distribution in a state of emergency or war. During the peacetime period, the way of organizing transport activities in business and

military logistics are in most cases the same, with military logistics emphasizing road and rail traffic due to cost reductions. In a state of war, military logisticians prefer faster and more efficient modes of transport, and air traffic is usually used. As a state of war is a specific state, the state usually approves much higher costs for the needs of the army, and thus the army can in most cases afford the use of air routes.

The best example of the use of air roads during a state of war is certainly the way of delivering the necessary ammunition and manpower to the front line. The use of railways and trucks would be inefficient due to high risk (enemy actions), and thus the airline (provided that the airspace is under the control of one side) is the fastest and safest mode of transport in the army. Along with the state of war come special types of transport itself (transport with the lights off while using alternative routes) which business logistics does not have to use. Additional specificity is in the security of transport vehicles. This is of course also realized in business logistics through companies that provide security services, but in military logistics this role is taken over by the army itself, depending on the transport vehicle.

The third specificity implies greater flexibility of the army in choosing transport routes. Take for example the need to transport a particular product on a route that includes several alternative routes. The final destination is separated from the main roads by a water surface. In this case, business logistics is limited by national logistics capacities, i.e. already created roads, and would be forced to choose a truck-ship route or to use an airplane. On the other hand, military logistics is much more flexible and has the ability to create new routes for the needs of the military. Thus, with the cooperation of military engineers, a temporary bridge can be created, which will enable a cheaper and integrated type of traffic. After analyzing the given specifics, one should not make the wrong conclusion that military logistics does not take into account cost analyzes. It does so on the same level as business logistics, but with a key difference in the relationship between peace and war, where the state of war introduces much greater state influence, while on the other hand, business logistics largely depends on the market itself. All other activities related to the transport and physical distribution, such as loading and unloading are similar. Other methods are used as well such as cross-docking method, pallets, intermodal transport, combination of different transport methods, etc. When we analyze costs, we need to analyze the most common costs. This will be presented through a tabular presentation of the costs of maintenance and use of selected vehicles of the Slovenian Armed Forces in Table 2.

Table 2. Cost calculation results for the selected vehicle – Slovenian Armed Forces

No.	Description	Value in EUR/km	Partial share in %	Overall share in %
1 Maintenance costs				
1.1	Preventive maintenance	0.15	14.7	7.6
1.2	Remedial maintenance	0.72	70.6	36.6
1.3	Fixed maintenance cost	0.15	14.7	7.6
	Total maintenance costs	1.02	100	
2 Direct use cost				
2.1	Variable cost of use	0.61	64.2	31.0
2.2	Fixed cost of use	0.31	32.6	15.7
2.3	Decommission cost	0.03	3.2	1.5
	Total direct use cost	0.95	100	
3 Total cost of use				
3.1	Total cost	1.97		100

Source: Grašić, Leon, Lerher Tone, and Bojan Rosi. 2016. "Evaluating costs of vehicle use in military logistics". Tehnički vjesnik, 23(6): 1679-1686

Table 2 shows the values of maintenance costs and direct use of selected vehicles, the cost per kilometer expressed in euros as well as their percentage where the total cost per kilometer for

the selected vehicle is 1.97 EUR. An additional interest is reflected in the share of different cost categories. As can be noticed, the largest share in the costs has the remediation that falls under the category of maintenance costs, whose overall share in the costs is 51.8%. Other costs represent the costs of using military vehicles where variable costs of use have a 31% overall share, while the total share of costs of use is reduced to 48.2%. From these data, it can be concluded that a large part of the costs goes to maintenance, which shows the great importance of this category of military-logistics activities, without which the organization of transport activities would not be complete.

An additional factor that greatly influences the choice of the method of physical distribution is the development of the army itself, as well as the economy of the country that the army protects. The US military has much greater resources than e.g. of the German army and as such has greater possibilities. However, analyzing the conflicts throughout history and the role of logistics, one trend can be noticed in them, and that is that the country with most resources does not always win wars.

Thus, logistical problems in the form of route, transport and security choices were best seen in Afghanistan, where coalition forces led by the US military had major problems, although they were well funded, while terrorist units used traditional modes of transport with domestic knowledge and much more traditional vehicles that were more successful in these conditions than modern technology. Here we come to the final specificity of logistics operations when it comes to the way of organizing transport activities, which are innovation and resourcefulness. The key specificity is in the form of similarities, where innovation and resourcefulness are imperatives when it comes to the organization of logistics processes.

In the end, if the military and business transport vehicles were placed next to each other, the only difference would be seen in the colors and the way of securing them. It is in this specificity that the similarities of business and military logistics, which are constantly learning from each other, can be best seen.

Comparison factor 4: risk and corresponding law

The biggest difference between business and military logistics is reflected in the risk that participants in logistics processes have. While a failed organization of business logistics processes for one company can become a major factor of elimination from the market, for military logistics a failed organization of military logistics processes can lead to the loss of human lives. The problem in measuring risk is that the analysis cannot take into account the logistics itself, but also the company or the army as a whole, because each logistics represents the bloodstream of every company or army. Therefore, absolutely every action on the logistical side has a causal relationship with the entire company or the army (each action has a consequence) and this effect is called the "butterfly effect".

In order to better understand the “butterfly effect”, it is necessary to show it on a practical example from business practices. The question we need to ask is how one logistical mistake can lead the whole company to bankruptcy? If the company does not dedicate resources to logistics systems, in the long run, there is a dysfunction of other departments as all departments are integrated into one system. On the other hand, delays in deliveries lead to dissatisfied consumers and partners. These two "marginal" mistakes, when neglected for a long period of time, can lead to loss of income and waste of resources, which is already becoming a serious problem that can lead to elimination from the market.

The situation is similar to military logistics. Unsuccessfully achieved goal in the form of protection of territorial integrity, sovereignty and human lives is a possible consequence of the poor organization of military logistics systems. On the other hand, in peacetime, the risk is much higher in business logistics, because all costs that the military makes can be covered through State aid, while that is less likely to happen in business logistics, and therefore the military is not

threatened by elimination from the market, thus the military logistics can maintain constant high costs precisely through the State apparatus, which enables greater sustainability. On the other hand, bankruptcy in the market is inevitable if the company does not know how to control the incurred costs.

If we look at the corresponding (competent) law as one of the specifics, we will notice great differences. The army is under the jurisdiction of special legal acts related to military activities, and usually, completely special and specific rules apply to the army and its activities due to the nature of its work. These acts can be both international and national, and the situation is further complicated if we take into account that the logistics activities of the army include both veterinary and ambulance vehicles.

Thus, in the case of military logistics, we have international humanitarian law in the form of the Geneva Conventions, but also every other type of military law that states usually regulate by special acts. On the other hand, business logistics operate under a wide range of legal acts that cover areas such as commercial law, traffic law, law of obligations, corporate law, international law, but also numerous international conventions governing logistics activities.

Comparison factor 5: logistics process management approaches

One of the interesting things about the military in relation to business logistics are the approaches to managing logistics processes, which in most cases coincide. Thus, in all logistics activities, we have certain methods that are used by both business and military logistics, such as push and pull methods, cross-docking systems, digitalization of logistics processes, etc. However, here it is necessary to pay special attention to the JIT management approach (Just-in-time), which does not exist in military logistics, i.e. it is used under modified conditions.

JIT approach implies the acquisition of materials at the right time, that is, at a time when these materials are needed. The question is why this system is partially implemented in the army? The answer to this question is very complex but can be summed up by reason of the nature of military activities. As can be noticed, one of the important (but not the only) factors that is a determinant on the success of military operations are resources. At the global level, resources that are important in both military and business terms are regularly traded. The key difference is the fact that in business logistics a surplus of products is a negative indicator as well as a shortage of products, while in the army a surplus of resources can mean one form of competitive advantage over the enemy. What distinguishes military production in a state of peace from production in a state of war are three sources of procurement in the army: 1) classical sources (key sources of resources received by the army from the State), 2) portable resources (resources that the army carries with it during relocation as e.g. basic military equipment) and 3) resources acquired by the military in the field (captured resources, equipment, land use) (Kress, 2002).

As one of the main tasks of military logistics is to ensure the sustainability of the operational part of the army through an efficient supply chain, excess resources allow the army greater sustainability, because in case of war it is not possible to simply purchase the missing resources. The negative effect of this type of management is reflected in the possibility of taking over the given resources by another army, which is one of the key military strategies.

Regardless, the JIT management approach is used in the military in an amended edition, where in some cases it is applied (peacetime period) and in others it is not. Modern methods of warfare bring military logistics to a position where the avoidance of the application of JIT systems is increasingly abandoned, and we are increasingly noticing their implementation in military-logistics processes.

Comparison factor 6: innovations

When we analyze innovations, both military and business logistics innovate in their own way. In the army, it is usually intensively innovated during the war, when due to the risk of losing

one's life, the army is forced to be better and more efficient than the other army. Here one can draw a parallel between innovations in business logistics and military, where business logistics is constantly innovating due to the daily effect of competition. In business logistics, innovation is necessary, because innovation is one of the factors of the company's comparative advantage that provides a more efficient supply chain and thus adds value to the final product.

Innovations in military logistics are mostly reflected in terms of artificial intelligence and its use in cyber defense, i.e. defense of information capacities of one country. Innovations in this area are realized more intensively than others because absolutely all armies in the world are potential victims of cyber-attacks by various entities such as terrorist organizations and other military forces (Destre, 2018).

Cyber-security is extremely important because it falls under the category of critical infrastructure. According to the definition given by the United States Department of Defense, critical infrastructure means "systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters" (US Department of Defense, 2020). The protection of critical infrastructure does not only mean the protection of given terms, but also the protection from the impact that natural disasters, technical or human error, intentional acts such as terrorism, etc. may have on the infrastructure (Kruszka et al., 2019).

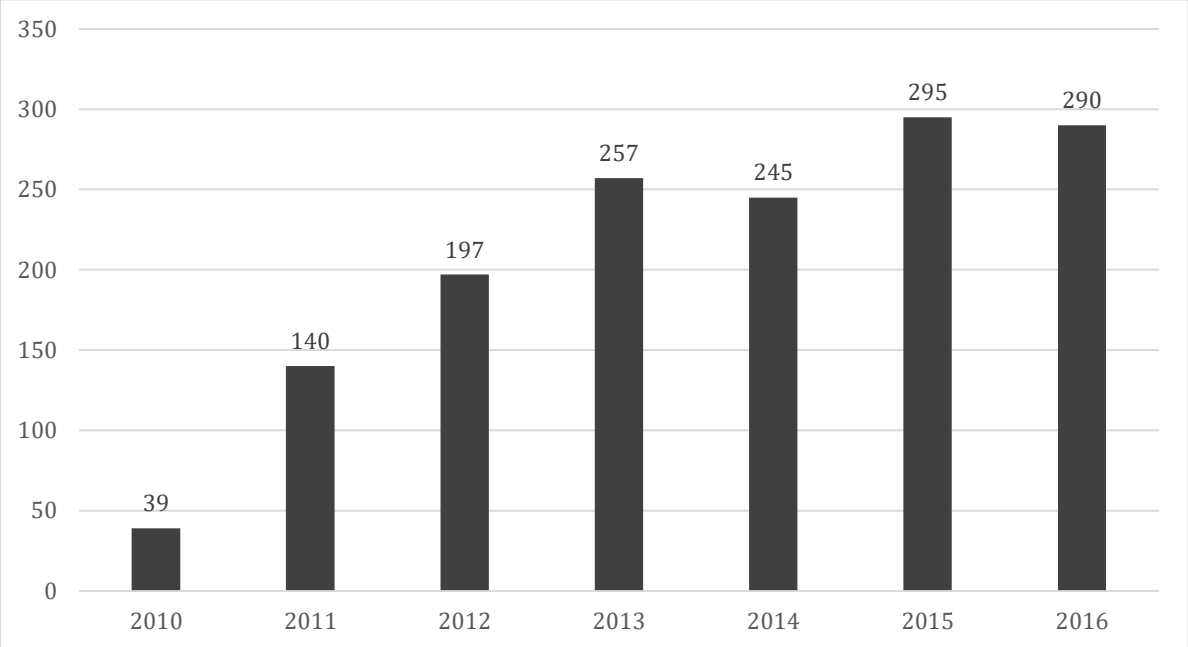

Figure 1. Attacks on U.S. Critical Infrastructure 2010-2016

Source: Authors calculations by Cybersecurity & Infrastructure Security Agency 2010-2016 reports (US Cybersecurity & Infrastructure Security Agency, 2010-2016)

Figure 1 shows the number of attacks (incidents) on critical US infrastructure in the period from 2010 to 2016 based on reports from the US Cyber Security and Infrastructure Security Agency. There is a trend of increasing attacks on critical infrastructure after 2010 as a result of increased investment in the cyber capacities of countries. The trend of an increasing number of incidents towards critical infrastructure shows the necessity of each state to protect itself from such attacks that can disable the entire system of one state, from which the collapse of logistics systems can have irreparable consequences. The importance of protection against cyber attacks

is also shown in the fact that the US stopped publishing data on attacks after 2016 due to the growing number of attacks in order to avoid panic among the population.

Military neutral states like Serbia have a higher degree of military innovation compared to countries under the protection of military alliances like NATO or ODKB members, given that the policy of military neutrality requires constant monitoring, analysis and creation of new ways to protect Serbia's military interests. On the other hand, countries that have a very active army around the world, such as the United States, innovate every day. This can be seen in the constant improvement of airborne military logistics operations which are becoming the dominant mode of transport in high power logistics systems. Thus, the United States is constantly improving the way cargo enters aircrafts by simplifying documentation procedures, but also by improving technology (application of the "Internet of Things", virtual reality, cargo tracking), which further enables digitalization of military logistics activities (Condon et al., 2004).

The military takes over the ideas of the Industrial Revolution 4.0 and applies most of the principles of a given revolution as business logistics. The key issue is security. However, through technological innovations in cyber-security and data protection, there is the possibility of creating a completely separate data storage system that is very difficult to compromise.

Comparison factor 7: logistics organizational structures

Most common mistake in organizing military logistics activities is neglecting them. This is visible during the organization of numerous military logistics systems where a large number of resources are invested in the operational part of the army, while obsolete technologies and outdated equipment are used for the auxiliary part of the army.

Thus, military logistics systems are the first to be hit when certain austerity measures need to be introduced, and the military usually uses vehicles produced during the Cold War, and in some cases during the Second World War. This treatment stems from the fact that many armies around the world are giving up logistics activities as important, and are openly neglecting them. Precisely because of such an attitude towards logistics systems, inefficient ways of organizing military logistics systems arise.

Military logistics systems around the world are usually arranged as a separate entity within the military. Although there is a desire among logistics officers to improve logistics activities, numerous external factors that they 3 business logistics is organized is more flexible and subject to change. There are many ways of organizing in business logistics, but some of the most important are functional, divisional and matrix organizational model (Aćimović et al., 2020).

In essence, the dilemma arises within the degree of centralization of each organizational structure. This is a particularly important issue in the field of military logistics, because military logistics in most cases use centralized logistics systems, as there are special organizational units for logistics activities. In business logistics, both centralized and decentralized systems are appearing, but due to the desire for control, more and more people are moving towards a centralized way of management. Although the decentralized way of management takes into account the needs of each unit separately, it requires high costs and overlapping responsibilities with a loss of control, which can lead to uncoordinated work within the company. The centralized way of organization solves the problem of coordination, but on the other hand, there is no insight into the special problems of certain organizational units.

A good way of organizing logistics processes is impossible to determine without a detailed analysis of the environment in which the company operates, and depending on many factors, the way of the organization will be different. It is essentially impossible to imagine military logistics as decentrali3zed, because that would lead to the loss of control of the military command, which is based on a hierarchical principle and which requires clearly defined competencies. One type of decentralization is achieved by delivering inputs from the field to the supreme command, which makes decisions based on those inputs that take into account the special requirements of all

parts of the army. This type of management requires investments in information systems that will enable a clearer understanding of the situation on the ground by the competent officers.

Precisely because of the complexity of this topic, armies around the world have begun to transfer such activities to private contractors and intermediaries who perform them instead. The com3bination of private sector innovation and the possibility of flexible organization of logistics activities with the military seems like a never more relevant topic that can eliminate numerous problems of military logistics such as lack of funding and strictly centralized structure. However, one needs to be extremely careful with the use of private contractors as they can bring a number of problems.

Results of the comparative analysis

After analyzing the given specifics of military and business logistics, we can notice that these two logistics branches coincide to a greater extent than they differ. This is not surprising considering that the root of business logistics is in the military and that both developed and learned from each other simultaneously. The differences stem from the very nature of the action, but the essence is the same - to meet the needs of end-users. Table 3 shows the results of the comparative analysis.

Table 3. Results of the comparative analysis of military & business Logistics

Comparison factors	Business Logistics	Military Logistics
Key activities	Management of transportation, warehousing, inventory (stocks), information and customer service as part of ***basic logistics activities***	***Basic business logistics activities*** **+** ***Specific military activities:*** 1) Production, modernization, and maintenance of weapons and military equipment; 2) Supply of weapons, military equipment and other resources; 4) Planning, construction, and maintenance of infrastructure facilities 6) Health protection, safety and health at work protection, veterinary protection, environmental protection, fire and explosion protection and other types of protection.
Organization of flows	Regular and recurring flows of products, services and information	Regular and recurring flows of ***military*** products, services and information
The Goal	Satisfy the needs of the end-user (***consumer***)	Satisfy the needs of the end-user (***army***)
Logistics Channels	Direct, indirect and flexible	Direct, indirect and flexible
Key Actors	Wholesalers, retailers and international intermediaries such as sales agents, freight forwarders, ***3PL and 4PL providers,*** etc.	***Private contractors***, military bases, operational centers, checkpoints, logistics officers as well as the state in the capacity of buyer, seller, manufacturer (dedicated state-owned companies) and monitoring.
Organization of Transport Activities	Railways, road traffic, water traffic, air traffic and pipelines	Different depending on the ***state of emergency***
Risk	Bankruptcy	Loss of territorial integrity,

Comparison factors	Business Logistics	Military Logistics
		sovereignty and human lives
Corresponding Law	Commercial law, traffic law, law of obligations, corporate law, international commercial law, etc.	International humanitarian and military law
Logistics process management approaches	In addition to the JIT management approach, business logistics also implement MRP systems, DRP systems, ADC systems, etc.	Limited use of JIT management approach
Innovations	Highly innovative due to market competition	Innovative only in certain situations of "never-ending war", military neutrality, or cyber-security defense
Logistics organizational structures	Centralized and decentralized systems	Strictly centralized logistics system

Source: Authors

The analysis shows the necessity of cooperation between military and business logistics on a daily basis, through the growing role of intermediaries such as private contractors who increasingly take over certain military activities such as logistics. Therefore, in the end, it is necessary to give certain recommendations for further improvement to both the professional and academic community:

1. ***Greater academic research*** is needed in the field of military logistics, where today this type of logistics studies major in military schools such as the Military Academy and it is necessary to include experts from various fields such as economy, political, security and organizational sciences;
2. In countries where this is not the case, it is necessary to ***clearly define the position*** of military logistics in the organizational sense by creating a special administration for logistics activities;
3. In order to eliminate the bureaucratic influence of the State on logistics activities, the military can redirect secondary activities to ***private contractors*** who will perform certain services more efficiently and cheaply;
4. In order to eliminate the problem of control and communication between the military and private entrepreneurs, it is necessary to ***clearly differentiate*** which activities the military can and cannot redirect to the private sector with a clearly defined analysis;
5. It's necessary to ***understand the specifics of military logistics*** when analyzing its efficiency and take into account all the determinant successes listed in the paper;
6. It's possible to implement successful elements of organization and management of business logistics in order to achieve optimal results, i.e. ***use innovations in the private sector*** and implement them in the military (and *vice versa*) as far as possible and in the way that is possible;
7. ***Adjust military and business trends*** to the situation in the field and analyze the situation through factors specific to the situation in which the military or company is; and
8. Demonstrate the positive impact of the private sector on the military sector and *vice versa* by introducing the private sector to military needs and ***pointing out the potential*** that the military sector brings.

Regardless of the implementation of the given recommendations, in order for them to be successful, it is necessary to connect the academic and professional community and create an open and two-way communication between them in order to complement and learn from each other. In addition, the issue of military logistics, but also military activities are not reserved

exclusively for military science, so it is necessary to integrate other disciplines such as economic, traffic, political science and security, in order to have a more in-detailed analysis and understand the specifics of military activities.

CONCLUSION

Military logistics implies a complex system, formally separate, but essentially very close to business logistics. As unsung heroes of history, military logisticians have shown the importance of logistics operations in the army, which through the development of modern technology has become one of the most important factors to the success of military operations.

The first part of the paper analyzed the concept, significance, development and principles of military logistics.

The second part of the paper analyzed the complexities of business logistics, where the specifics of business logistics and development of business logistics have shown the unbreakable link between business and military logistics, but also the complexity of defining the same concept given the fact that it is a young developing discipline.

In the third part of the paper, the specifics of military and business logistics were analyzed using a comparative analysis. The comparison criteria were defined first, and then a comparison was made through the defined criterion. The comparative analysis has shown a high degree of matching of both military and business logistics, and thus proved the research hypothesis (H_1) that speaks of the uniqueness of military logistics, which is formally separate, but essential very close in the field of business logistics.

In order to eliminate the negative effects of the private contractors, at the very end of the paper, eight key recommendations to the academic and professional public were given, with special emphasis on the need for greater academic research not only in military schools but across universities to better understand the issues of military logistics processes that cannot be understood by relying solely on military, economic, political, security or traffic sources but only by a combination of the same.

The results of the comparative analysis in the third part of the paper shows a high degree of matching of both military and business logistics. These results show the importance of military logistics in the new types of war that are usually fought on global levels.

Today, business and military logistics remain two formally different, but essentially inseparable units with the same root, facing the same future, striving to achieve the same goal- to satisfy the needs of the final user, be it a consumer or a soldier on the ground.

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