



FACTORS INFLUENCING THE MOBILITY AND COUNTERMOBILITY OF FORCES

Col. Adrian-Robert GHEORGHE, PhD Candidate*

The conditions in which the armed confrontations took place have always had a major importance on the outcome of military operations and this aspect has been observed and capitalized by specialists and military leaders. A realistic understanding of the existing conditions, doubled by a correct vision of the transformed confrontation environment that must be reached, makes the chance of success substantially inclined in favor of those who prepare in detail and in advance for the battles that are barely visible today.

Keywords: mobility; countermobility; geographical factor; enemy actions; military personnel training; host nation support; technical - equipment factor.

Currently, the range of risks and threats regarding security and defence, that all states have to face, has greatly diversified. If, during the Cold War, every state knew about the threats it had to face or who the possible aggressor was, now, this is not possible. The security environment, regardless of its manifestation level, has evolved and has characteristics such as: unpredictability, dynamism, complexity, in parallel with the emergence of some non-state actors and a significant increase in asymmetric threats to the security of states.

Military experience, things learned on various missions, the effectiveness of actions carried out through combat procedures, in different geographical conditions urgently require that all measures, contributing to the annihilation of the negative effects of some geographical factors on mobility and countermobility of forces be taken in peacetime.

Most papers referring to mobility and countermobility have structured the analysis starting with mobility and later, analyzing countermobility. When we talk about the factors that influence mobility and countermobility, I suggest a format that allows the analysis of countermobility in a complementary relationship with mobility.

Following this idea, it can be mentioned that the main factors influencing both mobility and countermobility are the same, namely: the

geographical factor, enemy actions, the military personnel training, the host nation support (HNS), the technical equipment factor (or the specific technical performance of the equipment).

Aspects regarding the determining character of the geographical factor on the mobility and counter-mobility of the forces

In order to substantially reduce the problems generated by the factors affecting the mobility of troops, in the tactical field, a creative, innovative management of the available resources is needed. For example, environmental conditions greatly influence the mobility and countermobility of forces, and this leads to the necessity of a multilateral use of data and conclusions established by military science, based on the specific interpretation of the geographical framework. In order for the mobility and countermobility of forces to be viable, all environmental factors must be taken into account, the influencing factors must be identified through an analytical-synthetic process, referring both individually and entirely to certain efficiency indicators.

An essential influence in planning and conducting military actions is that of the *geographical factor*. A fair appreciation of this influence, on the mobility and countermobility of forces is particularly important, as both overestimating and underestimating its role sometimes lead to serious consequences.

The process of modernizing the means of transport allowed the armed forces to be equipped

* „Dunărea de Jos” 10 Gen Brigade
e-mail: gheorghe.adrian@forter.ro



with new equipment that increased the mobility of structures and also increased the frequency of operations performed over long distances. Simultaneously with the new equipment, additional personnel, materials and equipment necessary for the use, maintenance and repair of the new means of transport were generated.

Due to technological progress, military science and art, the influence of the *geographical factor* on the mobility of military structures has been considerably diminished over time, but without being permanently removed.

Analyzing the influence of the *geographical factor* on the mobility and countermobility of forces, it was found that interesting conclusions can be drawn regarding the organization, endowment and principles of action, of forces placed in areas with different geographical features.

From this point of view, the military actions to be carried out in a theater of operations aim at the mobility and countermobility of the forces on land, on water and in the air, and from the point of view of echelons' actions, it includes all types of mobility and countermobility: tactical, operational and strategic.

The territory has always played a very important role in military actions. Its influence on the mobility and countermobility of forces is represented both by its extent and by the geographical elements it contains: the relief, the hydrography, the communications, the coverings, the localities, the fortifications, etc.

The territory is an essential factor in planning and conducting military actions, because it is a pre-established area, where the armed forces are deployed, organized and prepared, works and installations are made for military purposes, the supply bases necessary for troops are organized.

In modern warfare, joint forces that are facing each other from the very beginning are in large numbers, the equipment is also very varied, so that the area necessary for their safe disposition and concentration is not at all easy to be established. The considerable increase in the area of operation camps is mainly determined by the need to avoid the danger of destruction of these joint forces by enemy aircraft and missiles.

In the last classical armed confrontations, the depth of the operation area was determined, on the one hand, by the maneuvering needs of the large

tactical and operative units, and on the other hand, by the need for the logistic department to be able to carry out its activity, safely, against possible front line fluctuations and the direct actions of enemy combat equipment.

The mobility and countermobility of the forces also depend, to a large extent, on the terrain.

Due to the diversity of its forms, it is possible that the terrain become a difficult obstacle to overcome, to increase or reduce the effectiveness of fire, to favor or impede the mobility of troops, to partially or fully affect the firepower of different weapons, and the concentration of large groups of forces on different directions etc.

In terms of relief, the terrain can be divided into three basic forms: *plain regions*, *hill regions* and *mountain regions*.

"The plain regions, through their characteristics, have always favored the development of military actions"¹. The plain areas are the suitable terrains for the battles and operations, because they favor the concentration and mobility of forces and means, carrying out actions at a sustained pace, organizing and maintaining cooperation between all types of weapons, supplying the necessary weapons, etc.

In the plain regions, the large units (offensive joint forces) can make the most of their mobility and superiority of forces and means. The movement of forces in the plain areas is easy, which considerably facilitates the maneuver; in the offensive, it can take place at a faster pace and in deeper areas; the plain less favors the defence, but it is easier to perform the maneuver from the depth; the troops must be also arranged on favorable alignments (positions), to combine the engineering work and the existing obstacles with the execution of some offensive, fast and short-term actions. Therefore, dynamic, offensive and maneuvering actions must also be responded to, through dynamic and maneuvering actions undertaken by the defending forces. The numerically inferior forces defending on a low ground are forced to adopt a front with the forces staggered in depth, sufficiently dispersed, but able to quickly concentrate, in order to stop the enemy by fire and counterattacks.

A special feature of the plain regions is the numerous watercourses and the irrigation process (dams, canals, water storage basins, etc.).

In conclusion, it can be stated that the plain regions do not greatly influence the mobility of



troops, although in certain climatic conditions (torrential rains, thawing, floods), as well as due to irrigation systems, plains can become real obstacles, favoring countermobility.

The desert regions, through reduced communication, aridity and lack of vegetation (sometimes hundreds of km of sand dunes without drinking water except for oases, but also, here in completely insufficient quantities), the very big difference in temperature from day to night, the lack of orientation marks, etc., were considered the worst environmental areas for planning and conducting military operations.

The hilly and plateau regions allow the concentration of forces and this can be done under the same conditions as in the plain regions, in terms of space and the possibilities of grouping forces. Concealment and sheltering conditions are better than in the plains, due to both the varied terrain and to more frequent coverings. Despite all these advantages, the operational network must take into account the communication network and the movement possibilities, depending on the orientation of important ridges and valleys, encountering some difficulties, as compared to the plain regions, due to the more difficult movement of vehicles, as well as the opponent's possibilities to make it more difficult, through fire and obstacles, in areas that are more difficult to cross.

The varied, unevenly rugged feature of the hilly regions offers troops who defend themselves, even in inferior conditions, the opportunity to balance or reverse the power intercourse, to achieve victory, judiciously using each cover, performing bold maneuvers to surprise the enemy.

The mobility of forces in hilly and plateau areas is limited by the declivity of the land, by the lower number of communication routes, by the presence of coverages (forests, orchards), as well as by the vulnerability of the obligatory crossing points.

Mountainous regions are generally characterized by a very rugged terrain, with large differences in altitude between relatively close points or areas, with a poorly developed communication network, and a non-existent one, in some places, as well as by a harsh climate.

The terrain, heavily affected, greatly hinders the mobility of forces and facilitates countermobility measures. Steep slopes, narrow gorges and abundant vegetation on different parts sometimes

make it difficult for people and animals to move and make it impossible for vehicles and hypo vehicles to travel off-road.

The mountain forces the reduction of the maneuvering rhythm and the division of forces, which makes the superiority of forces and means, difficult to be capitalized. That is why the mountain has always favored defence.

At present, mountainous regions exert an influence on troop mobility that differs from that of the past, first of all, the mountainous terrain has become much more accessible, due to the increase in the number of communication routes that cross the mountain ranges; some of the roads built on a concrete bed, with tunnels that avoid large declivity, are of high traffic, others satisfy some local needs (forestry, mining, tourism, etc.), but are also important for ensuring the mobility of forces by having branches and reaching high altitudes. To all these are added the railway system and the cable car installations that contribute to the intensification of the traffic in the mountainous regions. At the same time, the countermobility measures were diversified, through multiple possibilities for mining the road and through the railway infrastructure.

On the other hand, the performances of the current combat equipment have increased a lot in terms of mobility and the possibilities of action in conditions of low visibility. The mobility of forces in mountainous terrain has also increased, due to the widespread use of helicopters. The movement of troops on the battlefield with the help of helicopters is only influenced by weather conditions and can be executed in a very short period of time.

Thus, a squadron of helicopters can quickly transport an infantry subunit with all its weapons and combat equipment. Also, the movement of the anti-armor intervention force in a threatened direction is successfully achieved, using helicopters.

Helicopters can be used successfully to cross mountain ranges. However, the characteristics of the mountainous areas determine certain restrictions in this case as well. The low number of flat surfaces suitable for take-off and landing, as well as the meteorological conditions specific to these regions limit the mobility of helicopters.

The low cloud cover, precipitation and fog are common phenomena in such areas. So, although the mobility of troops embarked on helicopters is



higher, in the current conditions, excluding travel on foot or by hypo means, the basis of their mobility in mountainous terrain is represented by combat and transport vehicles.

In the mountains, due to the fact that the movement of vehicles is usually limited off-road, the issue of communication routes is one of the main concerns of commanders. The lack of communication routes forces the transport of troops, supplies, medical and technical evacuations on the same roads, consequently, on these communication routes large congestions of vehicles and people can occur, leading to reduced mobility of troops.

The hydrographic network, composed mainly of watercourses, represents obstacles whose value depends on the width, depth, speed of the water flow in the respective geographical region, the nature of the riverbed, the nature and the configuration of the banks.

All these elements must be studied carefully, especially when they occur simultaneously in unfavorable conditions. Due to the endowment of troops with modern weapons and combat equipment, it is considered that in a possible war the combat actions will be characterized by an important spatial scope and by high speed, which will make the crossings of the rivers to be almost daily events. For this, the land forces were endowed with a large and diversified number of vehicles on wheels and tracks, with a high capacity to cross rivers.

The more land forces possess amphibious combat and transport vehicles, the better equipped they are with engineering vehicles, the less the watercourses will affect their mobility, and the greater the freedom of action the management will have. The endowment of the land forces with amphibious vehicles represents more than the "bridge building", and the mobility of the land forces, resulting from their endowment with such means, improves the premises for fulfilling the missions in all combat situations.

Recently, some armies have been equipped with hovercrafts, thus widening the range of equipment in the field of water mobility.

The special interest currently given to this new type of vehicle is also explained by the non-existence of a means of transport with wider possibilities of exploitation on rivers, lakes and swamps. The air cushion, effectively reducing friction and easily overcoming the hydrodynamic resistance, allows an increase in the speed of the vehicles. When

traveling over muddy areas, shallow water, uneven terrain or plowing, the hovercraft can also be a particularly valuable means of transport.

From the above overview, in relation to the various advantages offered by amphibious combat and transport vehicles, we must emphasize that they do not fully solve the requirement of water mobility of land forces, as not all vehicles have the ability to pass on their own over watercourses. In this case, it is necessary that the engineer forces contribute with their own means, to a greater extent, to the troops crossing over the watercourses.

The endowment of units and large units with modern combat equipment led to a considerable increase in the mobility of troops, but, at the same time, it increased their dependence on roads. The preparation and maintenance of the communication network is an essential condition for increasing the mobility of the maneuvering forces.

Air transport is well developed, given the geomorphological conditions of the land, as well as oil-rich resources, which allows the development of an extensive air network.

Most aerodromes are equipped with the necessary equipment to ensure the take-off (landing) of aircraft both during the day and at night or in severe weather conditions.

The geo-climatic conditions in which the military actions take place exert a special influence on the mobility and countermobility of the forces. The most important interrelated climatic elements negatively influence the mobility of forces and contribute to taking countermobility measures such as: temperature, humidity and wind. Thus, in winter time, the mobility of troops can be reduced especially by the low temperature, which negatively affects the resilience of people and the operation of the vehicle engines and by the snow that falls in thick layers, and when in blizzards, it forms snowbanks on roads and hinders movement offroad, especially during periods of thaw, fog, frost and winds, which are quite common in this season.

Considerations on how the actions of the enemy, the training of personnel, the support of the host nation and the equipment factor influences mobility and countermobility in the modern confrontation environment

Enemy actions. As it is known, the mobilization of the armed forces, their concentration, deployment and regrouping, the execution of



large-scale maneuvering during military actions require communication of all categories and in all directions, with a developed network of maneuvering, bypass, detour and backup roads. In a possible war with the most modern means, the rhythm of military actions will require all measures to be taken, to make the communication system as viable as possible against the means of destruction that will be used by the enemy to dismantle it.

The large-scale maneuvering of the means of combat and transport is a feature of modern warfare, given the likely intensification of enemy actions with missiles, aviation and special forces on travel routes, especially on communication nodes (road and rail) and junctions of different communication channels. The actions of the enemy will significantly influence the intensity of the activity on the communication networks. Moreover, we must keep in mind that in addition to the operative transports, the transport of materials, different armaments, the evacuation of the sick and wounded people, materials, etc. will have an extremely large volume.

Anti-aircraft defence is one of the decisive factors in ensuring freedom of maneuver and at the same time it is one of the vital conditions for the mobility of forces. In order for the forces and means of air defence to be able to firmly cover the maneuver of the forces and to have themselves the capacity to carry out maneuvers, they must have mobility and be able to change the battle order in a short time. Foreign military specialists understand by the mobility of air forces and means of defence, their ability to ensure the air cover of troops performing movements, regrouping or maneuvers. Also, anti-aircraft defence contributes to counteracting the mobility of opposing forces by hitting the means of air transport (personnel, equipment and materials).

In connection with the increase of the enemy's possibilities of actions, the issue of shortening the duration of troops and equipment transport acquired a special importance. It depends primarily on the speed of movement and the organization of embarkment-disembarkment actions at the final points of the communication routes. Increasing the speed of travel not only reduces the time when troops and materials are on the move, but also reduces the need for roads and means of transport.

In order to better meet the requirements of high-intensity traffic, in some geographical areas, roads

were doubled in some directions, with another road to bypass the localities and allow direct traffic; ring road of large localities; modernization of as many roads as possible; replacement of uneven passages at level crossings, in order to avoid bottlenecks caused by railway barriers; the construction, when passing over the mountains, of some routes through tunnels that avoid the portions with numerous serpentine, big slopes and dangerous curves.

At the same time, the existence of a developed system of communications on the probable directions of operations for carrying out military actions substantially contributes to the increase of troop mobility.

In the conditions of the extremely high consumption of materials, required by the modern warfare, the role of communications increases a lot, ensuring the supply and evacuation transports.

The importance of raids against communication networks has greatly increased. We must also keep in mind that supply can be disorganized not only by the destruction of supply routes, but also by interception or increasing the danger of interception of combat equipment and means of transport.

The enemy's possibilities of disorganizing communications have increased due to the appearance of special forces, paratroopers and aircraft that can be launched (landed) in the operational depth and which, due to their high mobility and increased passage capacity, can block, intercept and conquer mandatory crossings points, road and railway communication nodes, etc.

The works of art for crossing watercourses and hydro technical works are of great significance for ensuring the mobility of land forces. Bridges are the targets on which the enemy's attention is most directed, because their destruction can hinder the mobility of land forces.

Hydro technical works (piers, dams) are also important targets of the enemy, because their destruction can change the hydrological regime of the watercourse. In this context, within the conception of some military specialists for waging war, it is likely that in the theater of military operations vast areas of floods occur, by destroying piers, locks or other hydro technical works.

Within these considerations it is estimated that the flooding of valleys and rivers can be done by various procedures, such as: demolition of high pressure hydro technical nodes; opening, closing



or destroying dam gates; damming watercourses, valleys and passages through rubble or landslides. It is considered that in flood areas, even after the water recedes, due to the shape of the land and the water remaining in the deep valleys of the river, some parts of the land can be flooded for a variable duration, becoming difficult to access and even inaccessible to the actions of different troops.

In the context of countermobility measures that the enemy can take, the use of mines, in all its forms, retains an important role in the "obstacles maneuvering", taking into account the already made technical progress and the one expected in the coming years, much to the extent that, in relation to the firing of anti-tank artillery, the mined area constitutes a permanent anti-tank obstacle.

The variety of imaginable land obstacles against vehicles is virtually endless. It ranges from the classic anti-tank trench and anti-tank concrete fangs to the destruction of art works, including slippery products or artificial adhesives on the ground.

Another measure of countermobility that the enemy can take is the organization and development of electronic warfare, through which it tries to neutralize the radio networks of the opposing forces.

Regardless its number of people and equipment, no unit can be commanded if, due to electronic countermeasures, it can no longer use its radio networks.

The ability to properly use the means of electronic warfare greatly influences the mobility of forces. Command headquarters and weapons systems become very vulnerable on the modern battlefield if, due to their "electronic profile", they are easily identified. Thus, the chances of survival depend on the effectiveness of electronic protection measures by which radiation sources can be hidden or by which the enemy can be misled to their identity and position.

In order to counteract the enemy jamming, radio transmitting-receiving stations were made, working for a very short time (of the order of tens of microseconds) on a certain frequency, then make a random jump on another frequency; these jumps from one frequency to another (chosen at random) are performed hundreds or thousands of times during the broadcast. Such a device that works on thousands of frequencies, for very short durations,

is impossible to jam and it is hardly likely to witness in the near future the achievement of an effective system to jam them.

It goes without saying that, when listing these factors, we have not mentioned the full range of measures to reduce the mobility that the enemy can take, nor all the possibilities to counteract them. In this field, the imagination of military specialists and technicians permanently has a wide field of application.

Personnel training: The training of specialized personnel greatly contributes to the design, planning and execution of some complex works and obstacles designed to block, fix and return the enemy's forces while reducing its maneuverability and maintaining the freedom of action of its own forces.

Host Nation Support (HNS). The local population is an important factor in carrying out any operations to ensure the mobility and countermobility of forces. Within NATO, the need to carry out efficient and low-cost actions is the key element to providing logistical support. HNS planning coordination and assurance are key elements used to achieve this goal, and it is important that the development and negotiation of multinational Host Nation Support Agreement (HNSA) be applicable by all states. There is also a need for coordination of planning and uninterrupted supply, which will ensure the transparency of the requirements and the means of the host nation for this purpose and, in addition, there will result a need to encourage the use of such means in cooperation. Hence the importance of both developing and negotiating multinational agreements that can be applied by all nations. Thus, the logistics planner will discover that each situation can be a distinct challenge and will look for the necessary solutions to ensure the success of operations.

The performance of specific equipment. Countermobility specific missions are decisively influenced, in the conditions of the modern battlefield, by the performances of the specific endowment, as well as by the quality of the materials and engineering ammunition used for the execution of explosive and non-explosive obstacles and barrages. The state-of-the-art engineering technique ensures the short-term execution of the planned works in conditions of opportunity and efficiency. Engineering ammunition and high-performance



materials guarantee the expected efficiency of countermobility missions in correlation with the mobility missions of own forces.

Engineering logistics can influence the established countermobility objectives, due to specific tasks: providing ammunition, engineering and construction materials, providing engineering equipment and its maintenance, as well as providing transport, all particularly complex, due to the diversity and volume of equipment, ammunition and necessary materials.

Conclusions

It can be concluded that the multitude of factors influencing mobility and countermobility must be managed starting from peacetime in order to achieve the necessary conditions for the successful conduct of a future military operation. Giving due importance to the activities of transforming the future environment of confrontation in peacetime can be the key to success in a possible confrontation even in the situation where numerical superiority and/or technological superiority is to the advantage of the opponent. Also due to the execution of a correct management of the factors mentioned above, we can say that success could have a lower "price" in terms of the number of victims resulting from the confrontations.

The main aspects to be followed in order to optimize the planning process and the execution of military engineering works for military operations in the most favorable conditions for maintaining / increasing the mobility of own troops and creating the countermobility effect for the opponent's troops, aim at realistic determination of the military engineering works needs for the area of operations, identifying the main engineering support tasks and assigning them to the execution structures in accordance with the available capabilities and priorities set by the commander of the supported structure, identifying limitations and opportunities in the engineering line and developing proposals to address them, planning and the detailed organization of the engineering support by using the optimal

technical solutions concluded with an execution of the engineering tasks permanently adapted to the factors mentioned above in this article.

No matter how much the performance of the equipment evolves, we can say with certainty that the planners and commanders of the engineering structures will continue to make a considerable contribution to the success of military operations by constantly analyzing the five factors presented and using the results for optimal planning and execution of engineering support tasks specific to the achievement of the mobility of one's own troops and the counter-mobility of the opponent's troops.

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