multinational maritime forces, logistic support,
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CONCEPT OF LOGISTIC SUPPORT MODULE FOR MARINE TASK FORCES

The specificity of naval forces provide the continuity of logistic support of both the naval bases and in the joint operations area located at open sea. Logistical support of naval forces, therefore, includes a coastal support (ashore support) and on the sea (afloat support). The afloat support is realized by the ships of logistical support, universal supplies ships, tankers, medical support ships and floating repair ships. The ashore support is realized through a forward and advanced support system. The article presents the concept of the logistics module, which allows comprehensive logistic support for naval task forces operating at a long distance from their shore bases.

KONCEPCJA MODUŁU ZABEZPIECZENIA LOGISTYCZNEGO MORSKICH SIŁ ZADANIOWYCH

Specyfika działań sił morskich wymusza zapewnienie ciągłości zabezpieczenia logistycznego zarówno w bazach morskich jak i na morzu w rejonach prowadzonych operacji. Zabezpieczenie logistyczne sił morskich obejmuje zatem zabezpieczenie brzegowe oraz zabezpieczenie nawodne. Zabezpieczenie nawodne realizowane jest przez okręty wsparcia logistycznego, uniwersalne zaopatrzeniowce, tankowce, okręty zabezpieczenia medycznego oraz pływające warsztaty remontowe. Zabezpieczenie brzegowe natomiast realizowane jest w oparciu o system zabezpieczenia regionalnego i wysuniętego. W artykule przedstawiona została koncepcja modułu logistycznego, umożliwiającego kompleksowe zabezpieczenie logistyczne zadaniowych sił morskich działających w oddaleniu od baz brzegowych.

1. INTRODUCTION

The complexity of the security environment of the contemporary world makes it extremely difficult to predict the geographical location and degree of intensity of future actions. In today's maritime theater of military operations, naval forces should be able to immediately respond to occurring conflicts and crises.

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This situation extorted to move away from the concept of a balanced fleet to force adapted for use in specific missions. These conditions were reflected in the concept of development mobile and flexible forces, characterized by the possibility of actions in combined and multinational operations in different parts of the world. A very important role in these tasks plays a logistic support organization. Wide range of Multinational Naval Forces (including Combined Joint Task Forces) utilization requires that the structure of their logistics support should be a dynamic and allowed the appropriate use of the necessary material resources and at the same time flexible enough to satisfy the continuity of the multinational maritime operations. Logistical support is a complex undertaking, requiring precise planning and full synchronization with the operational plan.

Logistics module configured for the task force should ensure the supply of advanced naval forces (task forces, task groups), replenishment of consumable inventories on ships, replenishment of stocks of consumables in ships, conducting work-emergency rescue and repair work as well as medical support crews of vessels. The logistics module should include the elements of ashore support system and from one to several logistic ships.

2. LOGISTICS SUPPORT FOR MULTINATIONAL MARITIME TASK FORCES

Logistic support of maritime forces and naval task forces is achieved through the organization of afloat support, ashore support and national support. Logistic support includes replenishment of naval ships in the stocks of munitions and material, handling and repair techniques as well as the organization of maritime salvage and medical help. Complexity requires the coordination of logistic support, and therefore logistics system for Multinational Maritime Forces (MNMF) is created in accordance with the principles of international normative documents and publications of NATO standardization (for instance Maritime Standardization – MARSTANS).[3]

The ashore support for multinational maritime force is realized through a system of forward materials bases and maintenance points and medical devices used within the framework of Regional Support or developed as part of the Forward Support. Regional support is the main form of ashore support. Organizes them in a case where the size and spectrum of operations and the expected needs of logistic Multinational Naval Forces do not require the creation of the advanced support elements. This occurs when the maritime operation is conducted in the operational area of interest of a member country of NATO fleet. Advanced security is organized in the event of reasonable size and operational plans Multinational Naval Forces. As part of this protection may include, depending on the needs, Advanced Logistic Support Site (ALSS) or Forward Logistics Site (FLS). Number of running Advanced Logistic Support Sites, or Forward Logistics Sites in each case depends on the size and geographical dislocation of Multinational Naval Forces. Place of their location may vary depending on the development of operational activities.[4]

One of the most important issues relating to the activities of Multinational Naval Forces NATO is logistic support for ships operating in great distance from shore bases. In the logistic support system organized for Multinational Naval Forces have been given high priority given to afloat support. It enables ships operating within the task groups and task

[3] A. Bursztyński, *Logistyka marynarki wojennej,* AMW, Gdynia 2009, s. 267
[4] *Multi-National Maritime Forces (MNMF) Logistics ALP-4.1,* NATO STANAG 1406, 0303b

forces a long-term tactical and operational actions at sea without returning to ashore bases.

Combat ships operating within the naval task forces or groups carry out tactical tasks associated with the restoration of military readiness on the basis of logistic vessels, operating in a multinational formation. Within the framework of the multinational naval formations of logistic activities are carried out in the field:

- Supplying vessels in all types of munitions and material, solid and liquid, at sea, both in motion and stationary by using horizontal methods such as Fueling At Sea (FAS) and Replenishment At Sea (RAS);
- Accomplishment of the transfer of the ships personnel, mail and high-priority items PMC (Passengers, mail and cargo) by using the vertical transport helicopter VERTREP (Vertical Replenishment);
- Making repairs on the ship emergency damage and combat damage on the basis of a base repair of logistic support vessels;
- Evacuation of the wounded and sick from the decks of naval combat ships to collect them on the ship operating within a given formation or special ship with more medical opportunities.

Organization of logistic support for forces of maritime component should be implemented at operational and tactical level. If the logistical capabilities of single ships acting within a task group are not enough of these tasks can be achieved by shifting needed equipment between groups or based on single logistic support ships acting within the naval forces.

3. OPERATIONAL STANDARDS AND REQUIREMENTS FOR LOGISTIC SUPPORT SHIPS

In order to eliminate loss of time needed by combat units to reach meetings areas to with the logistic support ships it was assumed that the supply unit should go together with combat ship's formation. Consequently, the supply unit should have the required speed, endurance, radius of action.

Ship security enforcing the naval forces at sea are mainly oil tankers, universal supplies and multipurpose transport ship. Ship logistics service for the operating forces at sea are also floating hospitals and floating repair ship. Universal supply ships carry out tasks related to the provision of fuel, ammunition, dry cargo including food, spare parts and medical materials. On decks of these units is also formed repair fund for operating forces operating at sea. They operate at all times in areas of naval maritime forces and regularly complement their supplies. Floating repair ship have the capacity to repair damage and combat damage during conducted operations and during redeployment at sea, including the repair of aviation – deck helicopter aircraft. In the case of floating docks, there is also the possibility of making repairs to the underwater hulls of ships. [5]

In accordance with NATO standards fully capable of performing the task of securing the logistics ships, apart from general standards should meet additional operational standards and requirements.

[5] *Multi-National Maritime Forces (MNMF) Logistics ALP-4.1*, op. cit., s. 1-3

For operational standards should include:

- the possibility of using self-defense systems and missile defense systems (artillery);
- the opportunity to defend against submarines using interfering equipment systems and homing torpedo evasion maneuvers.

Been appointed to the additional requirements in the implementation of logistics tasks. These ships must be able to maintain, both day and night, high performance, replenishment combat ships supplying. This includes all types of material and weapon, including fuel and lubricants, ammunition, rockets, water and food and medical materials. These tasks should be possible in all weather conditions, which are expected in the area using horizontal method or from the stern, as well as by helicopter. Munitions and material contained on the ship must provide logistical support for naval combat replenishment for a period equal to 70% of the planned duration of the operation. [6]

Also, the hardware requirements for logistics support ships should have a full set of sufficient quantities of ammunition, guided missiles, torpedoes, mines, and spare parts for all types, supplied during the operation of ships. Communications equipment, in which the ships are equipped with logistics should be compatible with the equipment of supplied forces.

Ships logistics support should also be equipped with at least one and preferably three or more helicopters in different versions (antisubmarine action, multipurpose, reconnaissance, search and rescue). They also have the ability to managing activities, supply and maintenance embarked helicopters.

The main tasks facing the units of supply to be shortening the time to supply the combat units and increase the efficiency of cargo handling equipment. Supply unit is fitted with several points of discharge arranged in such a way as to be able to handle several naval combat ships and the ability to simultaneously provide them with various kinds of stocks (liquids, solids).

Built out of individual units' supplies are multi-purpose, universal, high-speed, high-tonnage, equipped with hardware capable of communication on the ship combat in a short time, all stocks of supplies in a single approach. The method used to transfer inventory depends on the capabilities of the host ship. Also fueling efficiency depends mainly on the capacity of the receiving and, in particular design parameters of the fuel system of the ship, which is supplied.

Currently, the aim is to ensure that the time for the transfer of stocks is also used to simultaneously remove the disability of weapons and technical equipment. Therefore, the supply unit should also be equipped with adequate facilities to permit making repair works at sea.

4. THE ESSENCE OF SUPPORT LOGISTICS MODULE

According to the assumptions of modern naval force should be composed of flexible task packages matched to the envisaged tasks (force packages). At the same time force structure should include repetitive modules, such as battlefield management system, the

[6] M. Zieliński, *Propozycje modułowych rozwiązań funkcjonalnych dla Marynarki Wojennej RP*, Rocznik Bezpieczeństwa Morskiego, Gdynia 2009, s. 167

system response (destruction), the system of the maneuver, the system of survival and logistic system. [7] Task modules should be configured according to the given tasks and requirements of modern maritime theater of war. In the expeditionary operation moving task forces require logistic support and the presence of ships logistic serve, which underpinning the effectiveness of combat action. Operating conditions for organizing the logistics support are dependent on the distance from the joint operation areas of their naval bases. [8]

Keeping the maritime forces and task forces ready for action needs to organize logistics support at the level that will meet the logistical needs of these forces. The totality of the task forces or logistical requirements of the task force is dependent on the needs of individual naval logistics groups.

$$P_{SM}^{\log} = \sum_{n=1}^{N} P_n^{\log} \tag{1}$$

symbol: $P_{SM}^{\log}$ - logistical requirements of naval forces;
$P_n^{\log}$ - logistical requirements of umpteenth ship;
N - number of ship, which is included in the task group formation.

Logistical support is to ensure the supply of material and weapon and the provision of specialist services and economic and living conditions for forces in the required quantity and quality and at the right time and place. Logistical requirements of a single ship, and consequently the whole naval force includes five basic ranges.

$$P_{SM}^{\log} = F\left(P_{SM}^{\log} n \;;\; n = \overline{1,5} \right) \tag{2}$$

symbol: $P_{SM}^{\log}$ - logistical requirements of naval forces;
$P_{SM}^{\log} 1$ - material requirements of naval forces;
$P_{SM}^{\log} 2$ - repair requirements of naval forces;
$P_{SM}^{\log} 3$ - medical requirements of naval forces;
$P_{SM}^{\log} 4$ - economic-living and special service requirements of naval forces;
$P_{SM}^{\log} 5$ - transport requirements of naval forces.

[7] Ibidem, s. 156
[8] D. Kozłowski, K. Karwacka, *Zabezpieczenie logistyczne ekspedycyjnych działań sił morskich*, Logistyka – materiały recenzowane, Poznań 2010, s. 7-10

The effective logistic support for naval forces can speak when the logistic capabilities of the system meet the logistical requirements of maritime forces. In determining the capabilities of logistics support must be taken into account the risks arising from the possible impact of the opponent or cause of the random event.

Properly configured, flexible and secure mobile logistics multinational maritime component should meet the expectations and needs of its commander. Depending on the set tasks, the size and composition of task forces and within the joint operation area from bases in the logistic task module should be integrated into various elements. They include afloat support, implemented directly in the joint operation area, including shore support, regional support, forward and advanced logistical support tasks arising from the host nation support.

Possibility of securing the requirements of maritime forces and task forces can be expressed in the form of the potential of the logistics task module provided for that purpose.

$$P_{SM}^{\log} \leq M_{SM}^{ZL}(t) \rightarrow \Pi_{SM}^{ZL}(t) = \Pi_{SM}^{ZL}(0) - \overline{\Pi_{SM}^{ZZL}(t)} + \Pi_{SM}^{OZL}(t) \tag{3}$$

symbol:
- $M_{SM}^{ZL}(t)$ - current capabilities of logistic support for naval forces;
- $\Pi_{SM}^{ZL}(t)$ - current potential of task logistic support module for naval forces;
- $\Pi_{SM}^{ZL}(0)$ - initial potential of task logistic support module for naval forces;
- $\overline{\Pi_{SM}^{ZZL}(t)}$ - consumed and damaged potential of logistic support for naval forces until t;
- $\Pi_{SM}^{OZL}(t)$ - reproduced potential of logistic support for naval forces until t.

The potential of the logistics task module should enable continuity of operations in accordance with the standards of the multinational naval force. At the same time, given the estimated duration of the maritime operation should be provided for the degradation and reproduction of potential of logistic task module. Potential degradation is a result of consuming resources, logistics, or as a result of destructive influence opponent. Reproduction of potential following as required by supplementing the resources of logistics module from source overriding logistics system. The required potential can be achieved through a combination of ashore and afloat logistic support.

$$\Pi_{SM}^{ZL} = F\left(\Pi_{Af}^{\log}\ ;\ \Pi_{As}^{\log}\ ;\ R_W\right) \tag{4}$$

symbol:
- Π_{SM}^{ZL} - potential of task logistic support module for naval forces;
- $\Pi_{Af}^{\log}$ - logistical potential of afloat support;
- $\Pi_{As}^{\log}$ - logistical potential of ashore support;
- R_W - relations of cooperation.

The potential of afloat support consists of potential logistics support ships, performing tasks in the joint operation area, which includes:

- The transport capacity of fuel and lubricants, ammunition and other classes of supplies such as food, spare parts, supplies and medical equipment;
- Ability to provide renovation services and repair;
- The possibility of transferring stocks for combat ships during the passage of the sea (Underway Replenishment). The extent of this fall refueling at sea (FAS) and the transfer of cargo solid horizontal methods RAS (Replenishment at Sea) and vertical - using board-based helicopters VERTREP (Vertical Replenishment);
- The possibility of providing medical service for crews of battle ships.

The potential of ashore support depends on the potentials of the components of shore logistics facilities. It includes the potential for permanent naval bases pursuing regional support and the temporary sea base used as a advanced support. Potential advanced support includes potentials of Advanced Logistic Support Site and Forward Logistics Site. In order to identify potential of ashore support must be examined:

- Capability to receive, store and inventory management of material resources and weapon;
- Capability to emergency repairs of combat ships;
- Capability to medical evacuation of wounded and sick from vessels operating at sea and protect them with medical aid;
- Capability to ensure the basing of vessels, including the provision of specialist services and economic and living conditions for the crews of ships;
- Capability to transfer personel of staff, urgent consignments and cargo using helicopters *VOD* (vertical on-board delivery);
- Capability to complement the maritime logistics support in joint operation area of fuel stocks with the use of shuttle tankers (shuttle tankers).

Relations of cooperation could include strengthening the potential of logistic task module cooperative relations of cooperation, or impair this potential for antagonistic relations of cooperation.

Cooperative relations of cooperation occur between mutually reinforcing systems of logistic support for combat ships and between the logistics systems of ships and logistic task. Relationships cooperative interaction. Logistic task module-level support ships exist between logistic support ships, logistic support systems and national support systems. In the multinational structures of a particular form of cooperative relations of cooperation are allied logistic solutions. [9] They may include:

- Mutual support for including whether the division of responsibility between countries in terms of planning, providing, operating and financing logistic;
- Specialization of task and assigning a leading role in the operation of one country;
- Multinational integrated logistic and medical units;
- Host Nation Support;
- The concept of the Third Party Logistic Support Services.

[9] Zob.: K. Ficoń, *Badania operacyjne stosowane. Modele i aplikacje*, BEL Studio, Warszawa 2006, s. 237

Antagonistic effect relationships can be very diverse in nature. May stem from the impact of the opponent or random event. In addition to the maritime zones of these relationships should include the possibility of severe hydro-meteorological conditions that make it difficult or temporarily impossible logistic tasks.

Considering the available options for logistic support of naval forces to be individually configured for each operation logistic module. The composition of the module, its potential and deployment of individual components must take into account the needs of ships and the geographical location of the area of operations.

Tab. 1. Predicted structure of the logistic support module for maritime forces

Litoral waters		**Open sea**
Near zone of operational interest	**Far zone of operational interest**	
Afloat logistic support		
Tanker.	Universal supply ship.	mobile ligistic support group – universal supply ship, – tanker, – hospital ship, – repair ship.
Ashore logistic support		
Naval base: – stocks of materials and munitions, – magazine, – repair plants, shipyards, – clinics, hospitals, – VOD. Host Nation Support	AlSS/FLS: – worlike and material stores, – magazine, – repair plants, shipyards, – clinics, hospitals, – VOD. Multinational methods of logistic support.	AlSS/FLS: – Shuttle tanker.

Task forces[10] or separate task groups[11] operating in the littoral waters, both near and far zone of operational interest logistic module will include part-developed afloat support vessels, and to a large extent, elements of the ashore support. In a near and zone of operational interest, the ashore support will be carried out by elements of regional support. However, in the far zone of operational interest in the composition of the task module elements of logistics support will secure the expanded elements of ashore elements. Where

[10] Task Force is formed from the compounds of naval and air forces and they are mostly equivalent to the fleet. It is a formation of forces capable of conducting the full range of activities at sea. The Task Force consists of several mostly heterogeneous groups (Task Group) and units (Task Unit) or the elements of Task (Task Element) acting with a common formation. Task forces of carrying out tasks autonomously or under the combined operations are able to combat the targets of surface, submarine, aircraft and conduct amphibious operations and support for combat operations on the shore. Zob.: *Regulamin działań Marynarki Wojennej DD/3.1*, Sztab Generalny Wojska Polskiego, Dowództwo Marynarki Wojennej, Gdynia 2009, s. 15

[11] Task Group made up of compounds tactical units. The TG may include individual task forces and naval aviation, and individual ships MW / PJP, producing according to their use homogeneous or mixed tactical flu. TG are capable of long-term viability of implementing the tasks in the specific (specialized) types of combat operations at sea. Zob.: *Regulamin działań Marynarki Wojennej DD/3.1*, Sztab Generalny Wojska Polskiego, Dowództwo Marynarki Wojennej, Gdynia 2009, s. 15

appropriate, these items will fall of Advanced Logistic Support Site and Forward Logistics Site. Elements of afloat support according to needs may be in the set of partial, which shall consist of universal supply ships or only a residual involving oil tankers.

Task forces operating on the high seas (blue-water navy), with the necessary logistic support task module will include the full afloat support, residually only complemented by elements of the ashore support. Potential of logistic support module will primarily depend on the potential logistics support ships operating in the composition of task forces and the various task groups. The need to ensure full logistic support for blue-water navy forces include the composition of universal logistic ships, fuel tankers and hospital ships. It is also necessary to ensure the feasibility of combat-emergency repairs at sea. For this purpose, in the task group formation should be floating repair ships. Residual ashore support is primarily based on completing inventories of fuel on logistic support ships. Fuel is transported to the logistic support ships operating near the littoral water by tankers shuttle from elements of logistic ashore support.

CONCLUSIONS

Logistic support system for maritime task forces is a dynamic system that must keep pace with the changing requirement of those forces. At the same time must allow for the implementation of logistic support for the actual operational situation in the maritime theater of military operations. Logistics operations, implemented for the naval forces head to maintain long-term readiness and capability of these forces to accomplish tasks and provide increased opportunities to reach goal of the operation.

It is anticipated that the current operations involving maritime component will be carried out on the areas of coastal (litoral) waters. This means that in order to achieve naval forces will have to move from the littoral area under the control of own forces by the areas of open sea (ocean) to the littoral area by crisis or a place of armed struggle.

Logistic support system protecting such operations should be based on national logistic support, ashore support, afloat support pursued by logistics support ship, and host-nation support. The concept of logistic support realized by task modules will correspond to different requirements than a logistic support system of balanced fleet. Logistics Modules should be configured individually for each task group. Their composition and capabilities should be adequate to the conditions in the maritime theater of military operations and the requirements of ships operating within task forces formation.

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