ROMANIAN
MILITARY
THINKING

THE NEED TO ADAPT NAVAL TACTICS TO TECHNOLOGICAL EVOLUTION. – DRONES AND PORT-DRONE PLATFORMS –

Colonel (N) Professor Lucian Valeriu SCIPANOV, PhD

Lieutenant Colonel (N) Instructor Valentin Costinel TOTIR, PhD Candidate

"Carol I" National Defence University

10.55535/RMT.2023.3.2

The creative genius and strategic vision of great commanders, influenced by technological advancements, have led to a continuous adaptation of naval tactics employed in independent or joint military actions throughout history. A significant period of time has passed during which it seemed that nothing had changed in the realm of tactics. The evolution of modern military operations, in the context of hybrid warfare, multidomain operations, and both conventional and special military actions, signals the need to reconsider the ways in which naval forces are involved in combat operations. The historical and evolutionary analysis of naval tactics suggests the necessity of conceptual adaptation to the demands of the operational environment and optimization of operational planning in light of technological developments. In this context, our concern is to identify theoretical approaches to the utilization of modern platforms that respond to the need for projecting new vectors. To achieve it, our focus is directed towards exploring the opportunities for developing drone tactics, particularly in the maritime environment, as well as promoting the concept of port-drone platforms.

Keywords: port-drone platforms; naval tactics; drones; unmanned vehicles; maritime environment;

INTRODUCTION

Within this approach, we have aimed to identify possible solutions for adapting naval tactics in relation to certain determining factors that have influenced the approach to the methods and procedures for using naval capabilities in military actions.

It started from the state of affairs observed in the military art field, from which it could be determined that technological evolution represented the motivational and inspirational factor for adapting the way of action of the forces through the use of new technologies and developed capabilities.

The evolution of modern military actions, in the conditions of hybrid warfare, multi-domain operations, in classic or special military actions, signals the emergence of reconsideration of the ways of involving the combatant forces, especially the naval forces.

We emphasize that the synergy between the creative genius and the strategic vision of the great commanders has determined a permanent adaptation of the naval tactics adopted in independent or joint military actions, to which the naval forces have contributed throughout history.

It can be also observed that a rather significant period has passed in which, in the field of tactics, nothing seems to have changed. However, the evolution of modern military actions, in the conditions of hybrid warfare, multi-domain operations, in classic or special military actions, signals the emergence of reconsideration of the ways of involving the combatant forces, especially the naval forces, a field in which, as teaching staff and permanent observers, we can consider ourselves specialists.

Therefore, the intrinsic motivation for the development of this approach starts from the premise that, considering the technological evolution, the adaptation to the conditions of the operational environment, and the optimization of the way of planning operations, the tactics were slightly overtaken by the technological advance. Thus, we have felt the need to be involved in identifying optimal ways of conceptually adapting the theoretical approaches regarding the use of platforms able to perform the projection of new vectors, especially naval drones. This area has attracted our attention, considering that their very emergence has led to a new approach to war, the model already being applied in military actions in Ukraine.

We believe that since the emergence and implementation of some tactics that positively marked the conceptual approach in military actions that changed the evolution of factual history, nothing relevant has happened in the sphere of military tactics. However, today we are witnessing new transformations of the classic tactical approaches through the lens of relevant factors that force us to reconsider the way of action in the tactical field. The main factors that have produced slight changes in the approach to established tactics are the technological evolution, the emergence of new platforms, the use of new vectors, the modification of the architecture of the operational environment, among other factors.

The emergence of new platforms has generated the adaptation of the tactics used in battle according to the mission and the specific tasks it could perform in relation to the contributions of other already existing capabilities (examples: the battleship, the submarine, the aircraft carrier, the mine hunter, the drone and autonomous platforms).

Upon a brief analysis, it can be argued that these tactics respect the doctrinal principles regarding the methods and procedures of application in military actions, but it can be admitted that, in fact, each of the factors generates the emergence of specific tactics. For example, technological evolution has generated the emergence of modern combat systems which, in order to be used, required an adaptation of the way of use in combat in accordance with certain classical principles, generating specific tactics, still valid today (examples: artillery, close-in weapon systems, drones and autonomous combat systems, radars, sensors and observation systems with innovative technologies). At the same time, the emergence of new platforms has generated the adaptation of the tactics used in battle according to the mission and the specific tasks it could perform in relation to the contributions of other already existing capabilities (examples: the battleship, the submarine, the aircraft carrier, the mine hunter, the drone and autonomous platforms). Regarding the use of new vectors, their evolution has kept pace with technological development, as well as with the nature of the operational environment (examples: torpedo, short-, medium- or long-range missile, submarine, drone). Last but not least, the modification of the architecture of the operational environment has generated an adaptation of the capabilities necessary to operate in the conditions imposed by the evolution of the environment, as well as by its nature (examples: submarine, maritime aviation, satellite systems, missile, drone, sensors, radar, sonar etc.).

To support our exposition, we will next analyse a system that, from the point of view of the use of some functional tactics, falls into almost all the spectrums of influence of the determining factors previously exposed. So, in the following, we will make an analysis of how drones have determined the emergence of new specific combat tactics, different from the established ones, or have shaped the already existing tactics, allowing the delimitation of those characteristics of the tactics that provide them with individualization.

We could say, in the first instance, that, in fact, drones are the ones that have adapted to the evolution of the operational environment, respecting the principles, methods, and procedures of use in military actions by applying the same tactical formulas used in artillery and missile tactics or other similar tactics. In relation to these aspects, we believe that precisely the emergence of the tactics of using drones represents the new paradigm in military affairs because their use combines certain methods and procedures specific to the complexity of the field in which the military action is performed (air, on the surface and in the underwater environment). Moreover, the emergence of these tactics has determined the need to discover and use some tactics to counter drones, an aspect that complicates the classical procedures of combat action of the capabilities intended.

The emergence of the tactics of using drones represents the new paradigm in military affairs because their use combines certain methods and procedures specific to the complexity of the field in which the military action is performed (air, on the surface and in the underwater environment). Moreover, the emergence of these tactics has determined the need to discover and use some tactics to counter drones, an aspect that complicates the classical procedures of combat action of the capabilities intended.

On the other hand, the principles of armed struggle and the general laws of war represent conceptual-doctrinal benchmarks that have not undergone changes in content, so that, in modern military actions, we have observed only a slight adaptation of some methods and procedures to the evolution of the operational environment. Therefore, the emergence of new vectors may seem like only a slight adaptation of the classical principles of combat to the new challenges of the complexity of the current operational environment. However, we believe that precisely this issue, of the appearance of drones, represents a great doctrinal challenge, as there are practically no tactics for using them in military actions, but we note that they have already been used successfully. Thus, we can say that technology has surpassed tactics and we are witnessing the emergence of new ways of overcoming the technological advance through concrete measures to conceptualize the methods and procedures used in such military actions, in which drones play the main role.

Moreover, with the development and consecration of these tactics, we believe that new platforms will emerge for the projection of these special combat capabilities in the three environments. Therefore, the novelty of our approach consists of the fact that we bring to the specialists' attention the need for the development of specialized force projection platforms. In this regard, for the naval field, we propose the conceptualization of the *port-drone platform* notion.

CONSIDERATIONS ON THE EVOLUTION OF NAVAL TACTICS

On 23 September 1338, the first naval battle of the Hundred Years' War and the first naval battle that employed artillery aboard ships took place. Near the Port of Arnemuiden (Armouth) on the island of Walcheren (Netherlands), five English ships, including Christopher, equipped with cannons, were ambushed by a fleet of over 50 French navy ships. Despite the imbalance in forces, the battle was fierce, and losses were comparable on both sides.

In this chapter, our aim is to identify the main historical milestones that have shaped the evolution of naval tactics as a result of technological innovations and inventions, the effects of which have led to the emergence of innovative methods and procedures that have brought success in the tactical field. Throughout history, there have been many such moments when the philosophy of conducting military warfare has undergone major transformations, sometimes driven by technological advancements that changed tactics and doctrines, and other times by the genius of leaders who provoked and accelerated technological evolution to maintain a balance between doctrine and technology in military actions. To highlight the importance of the synergy between military genius and the tactics or strategy of conducting warfare, we consider the most significant moments that have marked a major change in the specific naval warfare to be the emergence of naval artillery, innovative methods of naval tactics (such as the Battle of Trafalgar), as well as the introduction of new platforms such as line-of-battle ships, submarines, and aircraft carriers.

Artillery and naval weapon development

On 23 September 1338, the first naval battle of the Hundred Years' War and the first naval battle that employed artillery aboard ships took place. Near the Port of Arnemuiden (Armouth) on the island of Walcheren (Netherlands), five English ships, including Christopher, equipped with cannons, were ambushed by a fleet of over 50 French navy ships. Despite the imbalance in forces, the battle was fierce,

and losses were comparable on both sides. The importance of artillery aboard ships is highlighted by the fact that the English ship Christopher was the last one to resist the attacks of numerous French ships (Castex, 2012, pp. 18-21).

Analysing the technological evolution of shipboard armaments, we observe that the tactics and procedures used in combat have evolved based on the technical and tactical characteristics and destructive power of the weapons. The rapid increase in the range of artillery forced ship commanders to abandon the tactics of boarding enemy ships and engaging in close-quarters combat on the deck in favour of tactics that allowed striking or destroying an enemy from a greater distance (*The Evolution of Naval Weapons*, 1949).

Unable to limit the spread of scientific discoveries, inventions, and innovations, including in the military field, leaders were forced to face technologically comparable adversaries in a short time, compelled to exploit other advantages offered by the operational environment or their training and experience to ensure the success of military actions.

When the development of the striking and destructive capabilities of cannons experienced a stagnation or slowdown, military leaders turned to the creative genius and expertise of shipbuilders to create a tactical advantage on the battlefield. Consequently, maritime platforms underwent constructive evolution to meet the commanders' requirements and provide them with the necessary speed, manoeuvrability or firepower to defeat the enemy.

Impact of technological development

From a technological perspective, victory is not solely determined by the characteristics of the weaponry but also by the characteristics of the platforms on which it is mounted. When the development of the striking and destructive capabilities of cannons experienced a stagnation or slowdown, military leaders turned to the creative genius and expertise of shipbuilders to create a tactical advantage on the battlefield. Consequently, maritime platforms underwent constructive evolution to meet the commanders' requirements and provide them with the necessary speed, manoeuvrability or firepower to defeat the enemy.

The need for increased firepower and advantages in the tactical field, such as speed and manoeuvrability, led to the emergence of line-of-battle ships in the early 17th century. By utilizing wind power for propulsion and having a more streamlined superstructure due to the elimination of forecastles at the stern and centre, with close-quarters combat no longer essential, this type of ship could be equipped with more cannons by enlarging the hull. From this point on, warships were equipped with numerous gun ports located on one or more decks, featuring embrasures (special openings in the hull for artillery fire) on both sides. Having cannons placed on their sides, during naval battles, this type of ships would line up one after another in order to maximize the effects of artillery fire, hence the name *"ship of the line"* (Mahan, 1890, pp. 110-120).

Adapting naval tactics and the commander's creative genius

The evolution of the new combat tactics, initially used in an ad-hoc manner, forced the ships to advance and maintain the line formation and concentrate the fire from the cannons on the side facing the enemy to maximize damage. The influence of environmental factors increased in importance, as the line formation had to be maintained regardless of the hydro-meteorological conditions at the time of battle (Ib.), and any changes in wind direction were compensated for by the skill of the commanders and the design of the ships. It was the method of deployment in almost all naval battles for a long period of time, whether they took place on the high seas, near the coasts, in ports, or on rivers, and positioning the ships on the windward side was vital for ensuring success on the battlefield. However, military genius knows no limits, and the Battle of Trafalgar is emblematic in this regard. On 21 October 1805, Admiral Horatio Nelson, the Commander of the British Mediterranean Fleet, achieved a brilliant naval victory against the combined fleet of France and Spain, despite being outnumbered, near the Strait of Gibraltar (https://nelson-society.com/). It is not the only case where an inferior naval force succeeds in winning a maritime confrontation, but through a new and completely different tactic from the usual one at that time. Thus, this battle would influence the conduct of naval battles for the centuries to come.

On 21 October 1805, Admiral Horatio Nelson, the Commander of the British Mediterranean Fleet, achieved a brilliant naval victory against the combined fleet of France and Spain, despite being outnumbered, near the Strait of Gibraltar. It is not the only case where an inferior naval force succeeds in winning a maritime confrontation, but through a new and completely different tactic from the usual one at that time. Thus, this battle would influence the conduct of naval battles for the centuries to come.

Contrary to expectations, instead of aligning his ships parallel to the enemy's formation to achieve greater firepower, the English leader decided to attack the enemy formation from two perpendicular directions. Although it may seem disadvantageous because, at this stage of the battle, the number of Franco-Spanish guns was much

greater than that of the English, the advantage gained through the surprising manoeuvre of intermingling the English ships among the enemy's proved decisive in the outcome of the battle. To truly understand the impact and importance of this innovative naval combat tactic, it is enough to observe that, although twenty-seven English ships faced thirty-three Franco-Spanish ships, after approximately six hours of fighting, the British succeeded in sinking one ship of the combined fleet and capturing sixteen others without losing a single ship. The same discrepancy can be observed in terms of human casualties, as the English recorded 1,700 victims, including Nelson, while the Franco-Spanish forces suffered 2,600 dead and approximately 7,000 prisoners, including the commander of the combined fleet, Vice Admiral Villeneuve (Breemer, 1993, pp. 19-24).

Although wooden ships or sail-powered vessels are no longer used today, the combination of innate abilities and the conscious and subconscious study of the principles of military leadership can lead to the emergence of innovative strategies and tactics that, when translated into simple plans and correlated with the leader's ability to instil confidence in subordinates, as well as the implementation of the concept of mission command, can ensure victory even when one's fleet is technologically inferior or outnumbered. The famous message *"England expects that every man will do his duty"*, signed by Nelson, immediately electrified the ship commanders and increased morale and the will to fight among the English sailors, which also contributed to the achievement of such a brilliant victory (Hark, 2007, p. 2).

Although wooden ships or sail-powered vessels are no longer used today, the combination of innate abilities and the conscious and subconscious study of the principles of military leadership can lead to the emergence of innovative strategies and tactics that, when translated into simple plans and correlated with the leader's ability to instil confidence in subordinates, as well as the implementation of the concept of mission command, can ensure victory even when one's fleet is technologically inferior or outnumbered.

Adapting naval tactics to the emergence of new naval platforms and vice versa

Using old or new tactics and continuously improving the onboard weaponry, sailors have relied on line-of-battle ships for a long time to achieve the necessary maritime dominance for the progress and prosperity of the state. It seemed that, from an evolutionary standpoint, the apex of naval platform construction had been reached. However, everything was about to change in the second half of the 18th century with the emergence of the submarine. Initially met with scepticism by experienced sailors, the submarine built by David Bushnell before the American Revolutionary War (https://www.history.navy.mil) completely altered the approach to naval warfare by introducing the underwater environment into naval actions.

At first, submarines operated independently, with the success of the attack relying on concealment and surprise rather than on the concentration of force. These tactics, quite different from surface fleet actions, resemble guerrilla warfare at sea. The submarine stalks its target while the target searches for clues regarding its presence in order to take defensive, engagement, or evasion measures (https://www.britannica.com). The consequence of the submarine's emergence, its refinement, and the tactics used in naval warfare was the emergence of anti-submarine forces, represented by destroyers, maritime patrol aircraft, or helicopters. The tactical competition between submarines and anti-submarine forces got manifested through the development of new operational procedures, supported by technological advancements that allowed for faster construction and a greater number of submarines, as well as through the development of sophisticated systems for detecting and attacking submarines.

Faced with a technological disadvantage in the fight against specialized anti-submarine vessels, their commanders devised compensatory tactics. Thus, the Battle of the Atlantic during the Second World War is closely tied to the wolf-pack attack tactic (Showalter, 1995, p. 817). The efficiency and lethality of this tactic are demonstrated by the fact that in March 1943, Karl Doenitz's wolf packs sank allied ships with a tonnage exceeding six hundred thousand, while losing only fourteen submarines. It was the peak moment of the German submarine offensive, with the results of the confrontations between submarines and surface ships favouring the latter. In the same year, in May, the German submarine fleet sank transport ships with approximately half the tonnage but suffered the loss of forty-one submarines (Ib.).

The Battle of the Atlantic during the Second World War is closely tied to the wolf-pack attack tactic. The efficiency and lethality of this tactic are demonstrated by the fact that in March 1943, Karl Doenitz's wolf packs sank allied ships with a tonnage exceeding six hundred thousand, while losing only fourteen submarines. It was the peak moment of the German submarine offensive, with the results of the confrontations between submarines and surface ships favouring the latter.

The major disadvantage of the German tactic was that wolf packs were not permanent formations but were formed ad hoc and had a fluid composition. Upon receiving information about the position and destination of an Allied convoy, the submarine fleet command

directed a certain number of submarines to a sector along its most likely route. Command and coordination were carried out remotely, with no command relationships among the submarines engaged in the attack; they acted independently and freely. Perfecting this tactic, the US Navy created a coordinated attack group (CAG), which had an on-scene commander assigned to coordinate the actions of the isolated submarines to maximize and optimize the synergy of the attack (Hoffman, 2016, pp. 131-139)[1].

The naval battle, initially conducted by surface vessels, has grown in complexity with the introduction of the underwater environment into the battlefield through the emergence of submarines, culminating in aerial warfare when the use of aviation against surface vessels or submarines became possible due to technological advancements. In order to project force at a greater distance from national territory and to enable the attack of the enemy far beyond borders, the synergy between the ingenuity of engineers and the military leadership resulted in the emergence of a new naval platform, capable of incorporating and deploying the speed, manoeuvrability, firepower and precision of aircraft over considerable distances. Thus, the emergence of aircraft carriers marks the moment when an almost perfect symbiosis between air and naval forces is achieved, dominating the seas and oceans of the world to this day.

The Second World War represents a significant milestone in the evolution of naval warfare, during which naval power reached its peak influence on the conduct of wars. In addition to witnessing the largest land and air battles in human history, this conflict also witnessed large-scale naval operations, with their contribution to achieving victory being indisputable. Conducted on a global scale, the outcome of these operations depended largely on the pooling of resources by both belligerent alliances, which was dependent on ensuring freedom of navigation on maritime communication lines. The role of aircraft in ensuring this freedom is decisive, and the effects of aircraft on surface vessels and submarines have influenced naval tactics, maritime operational art, and maritime strategy (Brodie, 1946, p. 210).

The Second World War represents a significant milestone in the evolution of naval warfare, during which naval power reached its peak influence on the conduct of wars. In addition to witnessing the largest land and air battles in human history, this conflict also witnessed large-scale naval operations, with their contribution to achieving victory being indisputable.

[1] Dr. F.G. Hoffman is a researcher at the Strategic Research Center, National Institute for Strategic Studies, at the National Defense University in the United States of America.

One primary impact of these platforms on naval tactics is that the traditional formation of ships *in line* or *column*, which was the main instrument used by admirals to coordinate ships and ensure coherent action, needed to be changed with the development of airborne capabilities in combating surface vessels or submarines. Thus, the circular formation centred around the aircraft carrier has become the basis for command and control of ships during naval combat. This approach makes the overall force easily manoeuvrable, facilitates coordination and coherence of actions, and maximizes the synergistic effect of individual ship actions while achieving mutual support. By combining the capabilities and technical-tactical characteristics of both categories of forces, the main characteristic of modern naval warfare is coordination, which is achieved through doctrinal adaptation to technological advancements (Rubel, 2018, p. 117).

The technological evolution of naval platforms has led to their utilization in a wide range of maritime operations, with their capabilities for force projection, discovery and identification of potential enemies or adversaries represented by state or non-state actors being essential in stability operations, countering piracy, illegal trafficking of people and materials, or countering hybrid threats in the maritime domain.

In conclusion, throughout the history of military conflicts, naval tactics and technological evolution have influenced each other, driven by the need to gain an advantage on the battlefield and achieve military success. From the introduction and use of artillery on ships to the development of line-of-battle ships, submarines, and the use of aviation in naval warfare, along with the adaptation of older tactics or the development of new procedures for conducting naval operations, the constant objective has been to maximize enemy losses while minimizing one's own. Striking the adversary before they detect or have the opportunity to retaliate has been the focal point of technological genius and the talent of military leaders in managing a multilateral battlefield, where understanding and comprehending the operational environment architecture are increasingly important, regardless of whether the conflict takes place on land, in the air, or at sea.

Moreover, the technological evolution of naval platforms has led to their utilization in a wide range of maritime operations, with their capabilities for force projection, discovery and identification of potential enemies or adversaries represented by state or non-state actors being essential in stability operations, countering piracy, illegal trafficking of people and materials, or countering hybrid threats in the maritime domain.

A NEW CONCEPT – NAVAL PORT-DRONE PLATFORM

In this chapter, we aim to introduce a new concept, the ***port-drone platform***. Our approach is supported even by the lack of validation of such a concept in specialized doctrinal content, such as *Naval Doctrine Publication 1 – Naval Warfare* (US Naval Service, 2020), which was released in April 2020, or *Joint Doctrine Publication 0-10 – UK Maritime Power*, 5th edition, published in October 2017 (Ministry of Defence, 2017). On the other hand, the need for such an approach is felt, due to the fact that, slowly, such platforms are starting to emerge, under different names. The first step has already been taken by capitalizing on the concepts: modularity, multi-functional platform, and multi-role platform. This process was achieved by adapting existing platforms to new destinations, according to functions, roles, or operating environment.

The essence of the emergence of the concept of port-drone platform is related to the need to adapt the projects of future platforms to the requirements and specifications corresponding to the destination. Thus, the port-drone platform is a platform specially designed, built, and intended to fulfil various roles in military actions, with the main function of transporting, launching, and operating drones.

However, the essence of the emergence of the concept of *port-drone platform* is related to the need to adapt the projects of future platforms to the requirements and specifications corresponding to the destination. Thus, the port-drone platform is a platform specially designed, built, and intended to fulfil various roles in military actions, with the main function of transporting, launching, and operating drones.

When we refer to drones, it should be borne in mind that this concept sums up a series of characteristics depending on the operating environment, mode of operation, mode of movement, propulsion, destination, role, and other specific characteristics.

The following types of systems that operate different types of drones are known in the specialized literature: UAS (Unmanned Aerial System), UGS (Unmanned Ground System), USS (Unmanned Surface System), UUS (Unmanned Underwater System). In general, the acronym UxS or simply US (Unmanned Systems) is used to refer to all these systems without a crew on board (Scipanov, Dolceanu, 2020, pp. 62-68).

Generally speaking, a drone is an unmanned, remotely piloted, self-guided device (equipped with onboard artificial intelligence), or a combination thereof that can operate in the air, on the surface of water, on land, or underwater.

The general characteristic of the drone is observed, being a device without a crew on board, which, even if it is autonomous or not, the drone can benefit from the human intervention for effective piloting or at least for proper exploitation.

Compared to those proposed in this approach, we continue to present elements characteristic of platforms that operate in the maritime environment, in order to be able to build a port-drone platform concept.

Naval platforms are ships, aircraft, and submarines, especially for military purposes, specially designed to operate in the maritime environment and capable of carrying out missions in accordance with the destination, role, purpose, and function for which they were built. The port-drone platform will be a military platform, specially designed and built to be able to embark, accommodate, transport, launch, monitor, and control, deck landing, or recover drones.

Naval platforms are ships, aircraft, and submarines, especially for military purposes, specially designed to operate in the maritime environment and capable of carrying out missions in accordance with the destination, role, purpose, and function for which they were built. The port-drone platform will be a military platform, specially designed and built to be able to embark, accommodate, transport, launch, monitor, and control, deck landing, or recover drones.

Considering the peculiarities of port-drone platforms and their destination, the widest spectrum of missions is covered by naval surface port-drone platforms, which, as we will see, are able to operate drones in all three environments – air, surface, and submarine. In order to argue the need for the existence and use of port-drone platforms that operate on the surface, in the air, and in the underwater environment, we will carry out an analysis of their advantages and disadvantages. We mention these aspects due to the fact that, in the case of submarine platforms, the carrier-drone submarine already exists, because almost all existing submarines can operate underwater vehicles with various proximity missions. So, the submarine port-drone platform is represented by any submarine that can operate a UUV. The aerial port-drone platform will require a more detailed analysis due to the particularity of the operating environment. The aerial port-drone platform will gain utility in military actions when the advantages of the projection of vectors represented by drones will be opportunely exploited.

However, in this endeavour, we are focusing on the most versatile port-drone platform, in this case, the naval platform. In the case of surface vessels, the port-drone platform will represent a vessel specialized in operating aerial drones, surface drones, or underwater

drones. For this purpose, it is obvious that it will meet the specific requirements to embark, accommodate, store, transport, launch, monitor and control, relaunch or recover drones.

In the case of surface vessels, the port-drone platform will represent a vessel specialized in operating aerial drones, surface drones, or underwater drones. For this purpose, it is obvious that it will meet the specific requirements to embark, accommodate, store, transport, launch, monitor and control, relaunch or recover drones.

Table 1: Analysis of advantages/disadvantages of port-drone platforms (authors' conception)

PLATFORM TYPE	PORT-DRONE SHIP	PORT-DRONE AIRCRAFT	PORT-DRONE SUBMARINE
ADVANTAGES/DISADVANTAGES			
AUTONOMY	HIGH	MEDIUM	LOW
Drone carrying capacity	HIGH & VERY HIGH	LOW 1-2 PAX	LOW 1-2 PAX
Drone boarding possibilities	EXTENDED	LIMITED	LIMITED
Drone accommodation/ storage possibilities	EXTENDED	LIMITED	LIMITED
Capabilities to launch, operate and recover drones	MULTIPLE AND EXTENDED	LIMITED	LIMITED
Embarkation of remote operation teams	EXTENDED FACILITIES	SMALL AND LIMITED	SMALL AND LIMITED
Modularity-related destinations	EXTENDED MISSIONS	LIMITED MISSIONS	SPECIFIC MISSIONS
Roles and functions within the naval group	MULTIPLE	PUNCTUAL	MINIMAL
The possibility of adapting the project to the specific requirements of port-drone platforms	VERY ADAPTABLE	SLIGHTLY ADAPTABLE	NOT ADAPTIVE AT ALL

From the analysis carried out, depending on the degree of manifestation of some specifications, qualities, or particularities of the three port-drone platforms considered, analysis that consisted in assigning degrees of appreciation of the advantages/disadvantages that turn into strong points or vulnerabilities, it can be seen that the port-drone platform has the most strengths.

In conclusion, the *port-drone platform* has high autonomy, a large and very large drone transport capacity, extensive drone boarding and accommodation/storage possibilities, multiple and extensive drone launch, operation, and relaunch/recovery capabilities. Moreover, such a platform can embark on a considerable number of remote operation teams, is characterized by modularity, can have other related destinations, fulfils multiple roles and functions within the naval group. Last but not least, from a constructive point of view, it poses the advantage of adapting the project to the specific requirements of port-drone platforms without major additional costs.

THE INFLUENCE OF PORT-DRONE PLATFORMS ON NAVAL TACTICS

Information about the enemy and the operating environment is crucial. The variety of means by which information can be obtained is driven by both human inventiveness and technological advancements. These two factors are not mutually exclusive; on the contrary, they complement each other with the aim of increasing the quantity and quality of acquired information.

Continuing this endeavour, our goal is to identify the advantages generated by the use of port-drone platforms in naval warfare and their influence on surface, underwater, and aerial tactics and procedures.

The undeniable complexity and ambiguity of the operational environment necessitate a thorough understanding as a primary condition for overcoming these obstacles. In this regard, information about the enemy and the operating environment is crucial. The variety of means by which information can be obtained is driven by both human inventiveness and technological advancements. These two factors are not mutually exclusive; on the contrary, they complement each other with the aim of increasing the quantity and quality of acquired information. Thus far, although highly advanced, the technology-based analysis and decision-making tools, including artificial intelligence, are still morally contested. Therefore, the human factor, based on a wealth of information, remains responsible for determining the optimal means and methods to achieve the objectives of a maritime operation.

As we have seen, naval warfare takes place on the surface, underwater, and in the air, with these three environments being closely interdependent. Failure to succeed in any of these environments can lead to the failure of the entire operation. This generates the need for early warning as well as the identification and implementation of measures to mitigate the vulnerabilities and risks to which these environments are exposed, while ensuring an efficient and rapid response. Thus, obtaining a precise Common Operational Picture (COP) could be a viable solution to optimize command and control (C2) capabilities and gain a deep understanding of the maritime operational environment (Rădulescu, 2018).

One of the greatest challenges in understanding the maritime domain lies in creating the most accurate image of the underwater environment. Unlike the aerial and surface environments, where observation and assessment of the influence of environmental factors on military actions or the distances to targets can be done by human observers, the interpretation of the underwater environment is entirely dependent on technology. Therefore, we can say that underwater warfare is predominantly technological, where both threats and countermeasures are influenced by the progress and technical evolution of the equipment used. From this perspective, naval mines, with their diverse launching platforms, long lifespan, and the absence of human intervention required to engage a target, represent a serious threat with multiple effects, ranging from damaging and sinking ships to impacting the enemy's psyche, morale, or will to fight. Furthermore, with the emergence of mine hunters, the human factor is protected during mine countermeasures missions as the naval platform remains outside the mined area, and the actions of mine detection, identification, and destruction are carried out using devices controlled by an operator on board the ship (Tănăsescu, 2018, pp. 231-232).

While mining and mine clearance have existed in various forms since ancient times, submarine warfare emerged as a significant area of offensive and defensive military operations in the First World War. This global conflict marked the widespread use of submarines to attack enemy merchant shipping and warships, giving rise to both anti-submarine warfare (ASW) and competition between submarines and anti-submarine forces (ASW forces).

While mining and mine clearance have existed in various forms since ancient times, submarine warfare emerged as a significant area of offensive and defensive military operations in the First World War. This global conflict marked the widespread use of submarines to attack enemy merchant shipping and warships, giving rise to both anti-submarine warfare (ASW) and competition between submarines and anti-submarine forces (ASW forces). This competition evolved based on the predominant method of submarine concealment or detection. During the two world wars, submarines relied on radio communications to identify and attack convoys, but could also be located by anti-submarine forces. Another vulnerability of submarines during that period was their relatively short dive duration, which necessitated manoeuvring to avoid detection by the adversary (Clark, 2015, pp. 1-4).

Although submarines have significantly evolved, and their current submerged endurance is quite long, the need for replenishment of supplies or crew recovery requires them to enter ports or naval bases, thereby exposing their position, even if only for a short time, being observed and analysed by potential adversaries' specialized structures. This disadvantage can be mitigated by replacing submarines with underwater drones, which, depending on their configuration and equipment with various devices, are capable of conducting a wide range of missions, from maritime surveillance and research to search, detection, and neutralization of mines or enemy submarines. Moreover, the significantly lower maintenance and operational costs of these unmanned vehicles enable the creation of an impressive fleet that could make a significant contribution to gaining and maintaining control of maritime space in the required areas and timeframes (Tănăsescu, pp. 231-232).

Drones are perceived as a threat to the security of existing military platforms in military operations, and in some cases, they can even jeopardize the existence and development of new platforms, whether aerial, naval, or submarine. An example in this regard is the concern of British experts related to the future of nuclear submarines of the Trident class, in the event that the vulnerability of timely detection is exploited by a potential adversary through the use of underwater drones.

Recent history confirms that drones are perceived as a threat to the security of existing military platforms in military operations (such as the effects on Russian naval vessels engaged in the war in Ukraine), and in some cases, they can even jeopardize the existence and development of new platforms, whether aerial, naval, or submarine. An example in this regard is the concern of British experts related to the future of nuclear submarines of the Trident class, in the event that the vulnerability of timely detection is exploited by a potential adversary through the use of underwater drones (Hambing, 2016).

In conclusion, the role of drones in the success of military operations in the maritime domain increases directly proportional to their numbers, and port-drone platforms provide the optimal means for projecting this force into operational areas located at great distances from own ports and naval bases.

CONCLUSIONS

It can be observed that, in history, we can identify moments in which the philosophy of leading and conducting combat at sea has experienced major transformations, of doctrinal, technological, or operational nature. From the analysis, we can affirm the fact that, sometimes, it was the technique that determined the change in tactics, other times the creative genius of the commander, and, periodically, the technological evolution, so that, alongside the doctrine-technology binomial, a new element emerges, the maritime operative art, which completes a triptych specific to the military field: *doctrine – technology – creativity*.

The most important moments that changed the approach to naval combat were the emergence of naval artillery, the adaptation of naval tactics to the situation of the tactical field, and technological development, such as the emergence and development of naval platforms, without minimizing the influence of the creative genius of the military commander.

The *naval port-drone platform* is a platform specially designed, built, and intended to fulfil different roles, functions and tasks in naval actions, specific to the maritime environment. The naval port-drone platform exists under various names, characterized by modularity, multi-functionality and multiple roles. The essence of the emergence of the *naval port-drone platform* concept is related to the need to adapt future platforms to the requirements and specifications corresponding to the destination of their use in the maritime environment.

In the face of varied and ever-changing threats, the emergence of port-drone platforms is due to technological evolution and doctrinal adaptation, human inventiveness and ingenuity, as an adequate response to the need to contribute to maritime security.

From a technological point of view, the first advantage of future port-drone platforms is given by the possibility of adapting any platform to specific requirements without major additional costs.

From an operational point of view, the port-drone platform has high autonomy, physical protection of personnel, freedom of movement, secrecy of action etc.

From a tactical point of view, the port-drone platform requires an adaptation of the tactics of use in military actions. However, in our experience as specialists, this tactic will not be different from the use of other existing vectors, but they will also adapt to the creative genius of military commanders, being a synergistic result of the application of maritime operative art and the technical-tactical characteristics of the drones used.

In the face of varied and ever-changing threats, the emergence of port-drone platforms is due to technological evolution and doctrinal adaptation, human inventiveness and ingenuity, as an adequate response to the need to contribute to maritime security.

Drones and *port-drone platforms* represent a technological way that can contribute to strengthening maritime security by minimizing exposure to danger and protecting personnel and equipment, including the quasi-elimination of the human component in the task execution process while increasing the importance of the human factor in the process planning, decision-making and leading military actions.

BIBLIOGRAPHY:

1. Breemer, J.S. (1993). *"The Burden of Trafalgar: Decisive Battle and Naval Strategic Expectations on the Eve of the First World War"*. Newport Papers, no. 5, https://digital-commons.usnwc.edu/usnwc-newport-papers/5, retrieved on 29 May 2023.
2. Brodie, B. (1946). *New tactics in naval warfare*. Foreign Affairs (Pre-1986), vol. 24, iss. 000002, New York, https://www.proquest.com/scholarly-journals/new-tactics-naval-warfare/docview/198179774/se-2, retrieved on 13 May 2023.
3. Castex, J.-C. (2012). *Dictionnaire des batailles navales franco-anglaises*. Les Editions de Phare-Ouest.
4. Clark, B. (2015). *The emerging era in undersea warfare*. Center for Strategic and Budgetary Assessments, CSBA.
5. Hambing, D. (March 2016). *The Inescapable Net: Unmanned Systems in Anti-Submarine Warfare*. Parliamentary Briefings on Trident Renewal.
6. Hark, R.R. (2007). *Nelson Touch: A Model for Leadership?* Juniata Voices, vol. 7, https://www.juniata.edu/offices/juniata-voices/media/10-richard-hark.pdf, retrieved on 13 May 2023.
7. Hoffman, F.G. (2016). *The American wolf packs: A case study in wartime adaptation*. Washington: Joint Force Quarterly-JFQ, iss 80, https://www.proquest.com/trade-journals/american-wolf-packs-case-study-wartime-adaptation/docview/1770398949/se-2, retrieved on 29 May 2023.
8. Mahan, A.T. (1890). *The Influence of Sea Power Upon History, 1660-1783*.
9. Rădulescu, F. (2018). *Assessments on the need to integrate maritime unmanned systems into the data collection process, to develop and disseminate the Common Operational Picture specific to the maritime specific environment*. International Scientific Conference "Strategies XXI", suppl. TECHNOLOGIES - MILITARY APPLICATIONS, SIMULATIONS AND RESOURCES. Bucharest: *"Carol I"* National Defence University vol. 2, https://www.proquest.com/conference-papers-proceedings/assessments-on-need-integrate-maritime-unmanned/docview/2043182010/se-2, retrieved on 29 May 2023.
10. Rubel, R.C. (2018). *Mission command in a future naval combat*. Washington: Naval War College Review, vol. 71, iss. 2, https://www.proquest.com/scholarly-journals/mission-command-future-naval-combat-environment/docview/2060919636/se-2, retrieved on 23 May 2023.
11. Scipanov, L., Dolceanu, D. (2020). *The opportunity for using remotely operated underwater vehicles in support of naval actions*. Bucharest: The Bulletin of *"Carol I"* National Defence University, vol. 9, no. 3, https://doi.org/10.12753/2284-9378-20-38, retrieved on 23 May 2023.

12. Showalter, D.E. (1995). *Book reviews – the defeat of the German U-boats: The battle of the Atlantic by David Syrett/To Die Gallantly*: *The Battle of the Atlantic*, edited by Timothy J. Runyan and Jan M. Copes. The Journal of American History, vol. 82, iss. 2, https://www.proquest.com/scholarly-journals/book-reviews-defeat-german-u-boats-battle/docview/224915184/se-2, retrieved on 23 May 2023.
13. Tănăsescu, C. (2018). *Unmanned underwater vehicles as a possible response to dynamic maritime battlespace*. Bucharest: *"Carol I"* National Defence University, https://www.proquest.com/conference-papers-proceedings/unmanned-underwater-vehicles-as-possible-response/docview/2043182870/se-2, retrieved on 17 May 2023.
14. *The evolution of naval weapons* (March 1949). Department of the Navy, Bureau of Naval Personnel.
15. https://nelson-society.com/, retrieved on 29 May 2023.
16. https://www.britannica.com/topic/naval-warfare/Guerrilla-war-at-sea-the-submarine#ref511373, retrieved on 30 May 2023.
17. https://www.history.navy.mil/content/dam/museums/nmusn/PDFs/Education/Submarines.pdf, retrieved on 29 May 2023.

ROMANIAN MILITARY THINKING