The Navy of Montenegro in Planning a Multi-Agency Exercise of Search and Rescue and Emergency Response in Case of Sea Pollution

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Abstract: - This research aimed to provide a comprehensive and practical model for planning, executing, and analyzing multi-agency maritime exercises in Montenegro, focused on search and rescue operations and emergency response to sea pollution from vessels. The primary aim is to improve coordination among various government entities, drawing upon the expertise of the Montenegrin Navy Command's staff and adhering to military standards and the framework of national emergency plans. The study employs a systemic and hierarchical approach, utilizing NATO military methodologies adapted for civilian use, combined with flow modeling and SWOT analysis. The results highlight the importance of improving institutional and legislative frameworks to ensure effective and synchronized operations during maritime incidents. The proposed model was validated through a multi-agency exercise involving 19 national and civilian organizations, demonstrating its practical applicability and potential for future scalability in larger regional exercises. Key findings underline the necessity for enhanced interoperability, optimized resource use, and stronger regional collaboration in the event of major maritime incidents. Additionally, readiness preparations for III mission tasks involving the Navy, Air Force, and Maritime Security Administration forces were emphasized. The model offers a flexible solution for addressing Montenegro's maritime security challenges, with the potential for expansion to international exercises involving neighboring countries and NATO.

Key-Words: - Montenegro, Navy, Sea Pollution, Search and Rescue, Planning, Exercise, Multi-Agency, NATO Standards, Maritime Security.

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1 Introduction

Montenegro is a small country with three ministries and various institutions that have a distinct responsibility and obligation in connection with the safety of navigation and responding to incidents such as sea pollution from vessels. Search and rescue operations, protection against pollution of ships, and inspection functions in maritime traffic are performed within the framework of the Administration of Maritime Safety and Port Management - UPSUL, Port Authorities, and the Inspectorate for Safety and Security of Maritime Navigation, which are all under the Ministry of Transport and Maritime Affairs – MSIP, [1]. The Maritime Police, which operates within the Police Directorate, Ministry of Internal Affairs - MUP, is responsible for the safety of public maritime transport, state border surveillance, and border

control. The Navy of the Army of Montenegro within the Ministry of Defense - MOD protects the sovereignty, state territory, and national interests of Montenegro at sea, [2]. All entities have the resources to respond to incidents, but only to a certain extent. By working together in synergy, they can achieve maximum efficiency.

After the restoration of independence in 2006, Montenegro as a maritime country joined the International Maritime Organization - IMO and signed a number of important maritime conventions, [3]. In addition to the assumed obligations, Montenegro began intensively adopting other maritime standards and implementing international conventions important for maritime affairs. It also adopted civilian and military standards on its way to Euro-Atlantic integration. As a result of that journey, Montenegro joined NATO in 2017 and established its current regional leadership position in approaching the European Union. Montenegro adopted the National Search and Rescue Plan in 2006 [4] and the National Plan for Emergency Response in case of sea pollution from vessels in 2011, [5], [6].

Training and exercises are mandatory in both plans. However, the organization of exercises, planning, and scenario creation are not prescribed in detail. The national response plan to marine pollution incidents from vessels prescribes training and exercises in more detail. It is required that all persons who intend to participate in the implementation of plans for emergencies, at all levels, must be trained and qualified for their implementation. Training is carried out through courses and exercises at the local, national, and international levels, [7]. As for the frequency of complex exercises, they are prescribed to be performed every three years, [4].

The Navy of Montenegro, as a maritime entity, actively participated in all activities related to the implementation of the National Search and Rescue Plan and the National Plan for responding to incidents in the event of sea pollution from vessels, within the so-called third mission of the Armed Forces of Montenegro. It refers to assistance to state authorities in the context of natural and other accidents and disasters. Although regional and NATO naval exercises began two years before independence, the Navy of Montenegro has regularly participated in ADRION CAX since 2006 according to NATO procedures [8] and ADRION LIVEX [9]. Until now, several NATO standards related to the development of maritime capabilities have been adopted.

This paper introduces a novel model for planning, executing, and analyzing multi-agency maritime exercises in Montenegro, with the aim of improving the coordination between civilian and military entities. Leveraging NATO standards and adapting military procedures for civil use, the proposed model seeks to enhance the country's capacity to handle emergencies at sea more efficiently. This study not only addresses the gap in interdepartmental collaboration but also explores how the model can be scaled for larger international exercises, thus contributing to regional maritime security.

The key objective of this research is to provide a scientifically grounded and practically applicable model for multi-agency exercises. The proposed model was developed through a systematic approach that includes flow modeling and scenario development, combined with the integration of advanced communication systems such as TETRA. The study's results offer significant insights into how Montenegro can improve the practical implementation of its National Plans, ensuring more effective use of resources, enhanced preparedness, and stronger regional cooperation in times of maritime crises.

2 Problem Formulation

The analysis of previous multi-agency exercises showed that such events were mainly organized in the ports of Kotor and Bar, which are open to international maritime traffic. In accordance with the National Plan for Search and Rescue at Sea, it began to set up certain scenarios for a fictitious event (pollution, marine accident, plane crash, etc.) in which different maritime entities would be engaged. The planning process was reduced to developing a scenario. After that, logistics, IT support, and the like were upgraded. The key participants were: UPSUL, MUP, Protection and Rescue Sector, Police Directorate, Border Police Sector, Port Authority in Kotor and Bar, and the units of the Navy of Montenegro. Also, the Ministry of Sustainable Development, Spatial Planning, and Tourism, together with the Maritime Agency, the Agency for Ecology, the Ministry of Science and Education, the University, and the Institute of Marine Biology participated. These are maritime and other entities that regularly conduct individual and group training plans and exercises for responding to incidents at sea. Since 2011, in accordance with the National Plan for Emergency Response in the event of marine pollution from vessels, each exercise has had more and more

participants, and many have been involved in various other activities in accordance with the plan. So the issue of implementing two National Plans under the jurisdiction of UPSUL has become an interdepartmental issue, i.e. inter-ministerial issues. Such multidimensional problems lead to the fact that the entities participating in them, due to separated functions, plans, and budgets, and daily obligations, did not have the opportunity to allocate time and resources for training activities related to search and rescue and response in case of pollution at sea. This means that the tasks from the aforementioned Plans were not included in the regular Plans and tasks of individual entities for these emergencies. The analysis showed that not all participants fully knew the scenario of the exercise, did not deeply understand their functions, and often also the functions of the evaluator, [10]. After the exercise, many participants did not pay enough attention to the analysis.

It was evident that Montenegro, as a young country, developed procedures for the exercises of individual maritime subjects, but the need for defining joint and synergistic exercises was shown. Based on this, the problem was posed on how to plan, execute, and analyze a complex multi-agency exercise in response to incidents at sea. The exercise originally belonged to MSIP and UPSUL, which had no experience in that part of planning complex inter-service exercises. Since the Navy of Montenegro has for a long time been intensively involved in the participation and organization of various complex multinational military exercises at sea [11], a decision was made that the Navy of Montenegro will be the organizer of the interdepartmental exercise. Naval exercises reproduce not only military procedures but also search and rescue scenarios that require cooperation with civil authorities, [12]. It is important that NATO has policies and standards for the preparation, execution, and analysis of large multinational exercises, [13]. In Montenegro, the practical application of NATO standards and the realization of benefits for civilian purposes has already been a valuable experience. Because NATO standards are focused on interoperability between nations [14], this was a good basis for thinking about how to establish interoperability between different national maritime entities.

The complexity of the problem area covered by the two National Plans has a special maritime safety and security component in which tasks have been previously assigned and approved. [15] according to the National Plan of Search and Rescue at Sea, the Navy of Montenegro had its prominent place and assigned tasks in the function of search and rescue at sea. The National Plan for emergency responses in the event of pollution at sea from vessels, in principle, builds on the previous Plan. However, in the field of pollution from vessels, it was necessary to supplement its plans and tasks in accordance with the assigned obligation.

We can state that there are several shortcomings that should be solved. The lack of coordination between different agencies such as the Maritime Safety Administration, Port Authorities, the Navy, and the Maritime Police, together with weak resources and insufficient training for joint exercises, prevents an effective response to major maritime incidents. In addition, the absence of standardized procedures and the insufficiently developed legal framework for the organization and implementation of inter-agency exercises make cooperation even more difficult, while growing maritime traffic and climate change increase the risk of accidents and sea pollution. Finally, the lack of systematic post-exercise analysis leads to missed opportunities to improve operational readiness and adjust response plans.

2.1 Subject of Research

Thus, the subject of the research is defined as "the Navy of Montenegro in the planning of an interdepartmental search and rescue exercise at sea and emergency response in case of sea pollution from vessels."

In this context of the topic and the exercise that was conducted, the scientific discipline within which the research is conducted is the safety and security of maritime navigation. In this area, isolated events of the highest risk threaten the safety and security of maritime navigation. Organizational solutions that are adopted as a response to these risks, in accordance with international and national maritime and other regulations (from the wider context of the event) oblige the state to provide an adequate solution and response.

2.2 Objective, Hypothesis and Research Methods

The scientific goal of the research was set as a scientific description of the procedure for the preparation, execution, and analysis of an exercise for interdepartmental response in incidents at sea and its connection with measurable and verifiable facts.

The practical goal was to obtain an optimal procedure for the preparation, execution, and analysis of exercises for in-resource response to an incident situation at sea, in a qualitative and

quantitative sense, so that it takes place in the given form and in the given time. This would serve to improve the legal solutions applied by the aforementioned maritime entities.

Taking the above into account, the following hypothesis was put forward: "The Navy of Montenegro, with its capabilities and experience in applying military standards in planning exercises, can create a model of an interdepartmental exercise of search and rescue at sea and emergency response in case of sea pollution from vessels."

In the research, a philosophical method of understanding was applied in a systemic approach to the subject and research problem. The general scientific method of modeling was applied as the primary method in the research. Along with this method, during the research, scientific description and special scientific methods of analysis and synthesis, analytical evaluation method using the SWOT method, and verification of the model with a questionnaire and a real check were applied.

3 Problem Solution

Tasks related to the organization of search and rescue operations for people and property in accordance with the National Plan for Search and Rescue at Sea are carried out by UPSUL, as part of the Ministry of Maritime Affairs and Transport - MSIP. The bearers of activities and the organization of search and rescue at sea consist of the National Headquarters of Search and Rescue at Sea, Center for Coordination of Search and Rescue at Sea - MRCC, and observation and rescue units of search and rescue, [16]. For the execution of tasks, UPSUL is given an organizational form by the National Search and Rescue Plan at Sea. The optimization of staff processes and the sufficiency of forces was solved by adding officers and forces from the Ministry of defense and Ministry of interior, and due to the very importance of the task, they remained in the Coordination Center until the end of the task.

Works related to the protection of the sea from pollution from vessels (suppression, reduction, and elimination of the consequences of pollution) in accordance with the plan [5] emergency action in case of sea pollution from vessels is also carried out by UPSUL. This plan establishes the principles of work and action, tasks and duties, measures and procedures for preventing, reducing, and eliminating the consequences of sea pollution from vessels. The plan applies to the following isolated events or types of risk: collision of ships, groundings, fires, explosions, structural failure, accidents during ship management or other events on board or due to accidents on offshore maritime facilities or due to the sinking of a ship, crash of an airplane or helicopter in the sea, a sunken plane, accidents at coastal installations and terminals or an extraordinary natural event at sea. The system envisages three levels of readiness and response. The organization of headquarters affairs refers to the assessment of oil spills and the degree of urgency of response. The high-risk response management model is implemented through the formation of the Incident Management Group and the Technical Group.

We can state that there is no other state solution for handling these two complex maritime security, legal, and organizational problems.

The analysis of the tasks in the Rulebook on the internal organization and systematization of MSIP did not determine the obligations of planning MSIP and UPSUL exercises. However, according to both national plans, UPSUL is obliged to conduct training and exercises, [16].

The National Search and Rescue Plan only states that all UPSUL employees who by nature of work participate in search and rescue operations are required to acquire the necessary expertise for search and rescue operations. At least once a year, the Center for the Coordination of Search and Rescue at Sea - MRCC is obliged to carry out an exercise of checking readiness, establishing communication links, and organizing with other state authorities in connection with search and rescue, [4].

The national response plan to incidents in the event of marine pollution from vessels considers the task of the exercise in more detail and sets the objectives of the exercise as training, improvement of cooperation and coordination between participants in the response, testing of the chain of command, and communication. Equipment and plans. Both of these national plans require the joint action of key actors. The National Search and Rescue Headquarters consists of the Chief of Staff, the Deputy Commander, and five members. One member is from the Ministry of Defense, and one is from the Ministry of Internal Affairs. The task of the Headquarters is to conclude cooperation agreements with asset owners who regularly or occasionally participate in search and rescue operations at sea. Also, the Headquarters is obliged to organize joint action and cooperation in search and rescue with other ministries and state bodies in order to rationally use employees and available equipment, [4]. According to the National Plan for responding to incidents in the case of sea pollution

from vessels, the administrative body can, in order to respond to pollution, enter into a memorandum of understanding, contract, or agreement with other authorities responsible for pollution or other authorized organizations. Such a cooperation agreement [17] was signed between the Ministries of Interior, Defense and Transport and Maritime Affairs in 2015. For the purposes of this article, it is important to note that the result of this agreement is the formation of a Joint Operations Team, which plans, organizes, and conducts joint exercises at sea.

3.1 The Navy of Montenegro in the Development of the Exercise Model

Making a decision in real conditions in the Command of the Navy of Montenegro is a complex process of the work of the staff authorities in accordance with the received task or directive for a separate event of attack or defense with the available forces and allocated resources. When it comes to tactical joint and complex international exercises with partners and later with allies of NATO countries, the Navy of Montenegro gave and is giving full contribution in planning, organizing, and conducting exercises. For these reasons, and according to the third mission of the Army of Montenegro [18], the Navy has the capacities (command, staff, personnel, space, IT, and archived verified checked and conducted exercises) so that its capabilities in developing a multi-agency exercise model were predestined for a possible optimal and reliable concept of a successful model. The newly separated security risk in relation to combat risks was a recommendation to allow the Navy to develop an adequate response model in accordance with the National Plan for Search and Rescue at Sea and the National Plan for Emergency Response in Cases of Sea Pollution from Vessels.

A systemic approach to design, planning, execution, and analysis was used to develop the model of multi-agency exercises. NATO has used this approach for a long time, [19], [20]. NATO standards are always implemented to harmonize with national legislation or to be changed to make the standards accepted. However, for this purpose, it was not possible to simply map the point of view and procedures of the military-defense sector with practical solutions for the training of NATO soldiers and military units, which represent much more complex problems of preparation, planning, verification, and execution of combat actions, as well as the execution of the command in those conditions.

The application of different types of process models and diagrammatic system descriptions helped to connect and improve the understanding of the functions of people, departments, and resources of different interacting ministries. Processes consist of sequentially feasible activities, which have a beginning and an end. Flow modeling and Gantt chart methods were applied during modeling.

A process of several steps and stages is generally proposed to explain the long period of preparation for the gathering of members of the joint table of various government authorities and departments that include economic and maritime entities. Each step consists of a large number of activities that are performed sequentially or in parallel with each other. All activities that are specific to military systems for this purpose have been modified or discarded.

A four-step planning and exercise process is proposed:

I Developed the exercise concept and specification
II Exercise planning process
III Operational performance of the exercise
IV Analysis and reporting

Figure 1 (Appendix) shows the steps of the planning process and the exercise phase.

The purpose of Step I - Development of the exercise concept and specification is to establish the general requirements for the exercise, setting goals and objectives and developing a sustainable exercise concept to achieve them. The necessary inputs, organizational responsibilities, and flow of key activities required for the exercise specifications are described. The main document achieved in Phase I is the Exercise Specification, which declares the person responsible for the exercise specification - the officer planning the exercise- and is the basic document that sets out training requirements, links resources, and delineates responsibilities. In this phase, a Group for planning exercises is formed and, if necessary, the field is visited.

The purpose of the second step of the exercise planning process is to identify specific requirements for the planning, development, coordination, and publication of the Exercise Plan and all necessary documents related to the exercise scenario and execution.

Step II is organized from the following key activities:

1. Establishing a core planning team
2. Creating an exercise plan
3. Development of a scenario with a list of main events/list of main incidents

4. Holding an initial planning conference
5. Holding the Main Planning Conference
6. Holding the final coordination conference

Step III - The operational execution of the exercise will be carried out through four phases:

1. Basic training
2. Crisis response planning
3. Performing the exercise
4. Evaluation

Step III should provide basic training through individual and collective training related to the exercise, as well as the integration of the results of phase II (crisis response planning) into the subsequent development of the results required for phase III (execution of the exercise). Finally, we need a quick evaluation.

The purpose of Step IV - Analysis and Reporting is to determine whether the exercise was successful in achieving the training objectives and exercise objectives. This step also analyzes the observations from the previous phases and validates the proposed corrective measures to obtain valid lessons learned that have been identified at both the operational and exercise levels. Step IV is carried out through three sub-phases:

1. Collection of data and information
2. Evaluation, analysis, and evaluation
3. Lessons learned

The analysis and reporting phase is largely related to the process of identifying lessons learned. NATO standards for lessons learned from the training of soldiers and military units are detailed and systematic and can be a model for exercises of this type

3.2 Evaluation of the Exercise Model

The proposed model is subjected to a verification and validation process in order to assess whether the model is well built and whether it meets the needs of the client and the assigned obligations. This was first done with a discussion with representatives of UPSUL, the Port Authority, and the Department for Emergency Situations. The model has been rated positively, [21].

Real verification of the model was started by organizing an interdepartmental exercise (Figure 2, Appendix), in which 19 state public and business entities participated. The decision to conduct an interdepartmental exercise was made based on the conclusions of the meeting of the Joint Operational Team held on February 23, 2018, with the aim of verifying; tactics, techniques and training in the implementation of procedures of both state and civil entities in the case of sea pollution from vessels in the port of Bar, [21].

The Command of the Navy of Montenegro, as the only state body that had experience in planning exercises according to the NATO standard, was designated as the bearer of the planning process. It must be noted that 19 state and civil entities were supposed to participate in the exercise. How complex and demanding the task was for the Navy of Montenegro can be seen by the level of responsibility in the chain of decision-making and command. We start from the fact that ministries are at the strategic state level of decision-making. The Navy of Montenegro is a unit of the General Staff of the Army of Montenegro, so we can say that it is the tactical level of command in relation to the UPSUL, which is a state body at the operational level.

The Main Planning Team was formed and the documentation for the exercise was prepared. In accordance with step II of the model, the required number of people from several subjects to work in the exercise unions (operations, logistics, normative-legal, public relations, force protection, informatics, and communications) was determined. The initial document for planning the exercise - Exercise Specification was signed on April 18, 2018, by the Minister of Transport and Maritime Affairs of Montenegro, which provided key guidelines for the planning process.

Also, according to step II of the model, the planning process is fully implemented:
16.03.2018. The initial planning conference was held in the building of the Maritime Safety Administration in Bar, 30.03.2018. Survey of the terrain and familiarization with the port infrastructure in the port of Bar, 01.06.2018. In 2008, the Main Planning Conference was held at the command of Navy of Montenegro in Bar, 19.06.2018. The final coordination conference was held at the Command of the Navy of Montenegro in Bar.

In addition to these activities, meetings were held at the union level for better coordination and preparation of high-quality planning documentation, [17].

Figure 3 (Appendix) shows the exercise command structure according to the Exercise Specification.

All planning documentation for the execution of the exercise is systematized in the required number of attachments. The scenarios are defined in the documents, and the final document of the Exercise Specifications was approved by the Minister of Transport and Maritime Affairs on June 19, 2018.

According to the dynamic plan, the multi-agency exercise began on June 22, 2018, with the gathering of forces in the waters of the port of Bar. During the 23rd and 24th of June, the participants of the exercise engaged in individual preparation (familiarization with the course of the exercise, preparation of equipment and personnel, introduction to the other participants of the exercise, etc.). During this period, the connection of the participants and several exercises related to extinguishing low-intensity fires in the port area, the preparation of equipment for the prevention of sea pollution, and the verification of the Command Group of the Joint Operational Team for the Management of Emergency Situations in the decision, the drafting process and the engagement of forces in the field were checked.

In order to show the capabilities to the general public, on June 25, 2018, a "Day of High Officials" was organized, which was attended by high representatives of all three ministries (defense, interior affairs, transport, and maritime affairs), representatives of local self-governments, the diplomatic corps, and invited representatives of international and domestic organizations. The director of the exercise presented the details of the exercise: monitoring of the southern Adriatic and exchange of information on maritime awareness with partners from the region, NATO, and other international organizations in the field of maritime safety and security. Then the high-ranking guests followed the exercises in the waters of the port of Bar according to defined scenarios.

The capability demonstration began with a demonstration of the work of the Joint Operations Team Command Group led by the Captain of the Port Authority Bar as the on-scene commander. The scenario revealed that there was an accident in the port of Bar with a fire at the oil terminal which has a tendency to spread to the port infrastructure. In accordance with its powers and the National Incident Response Plan, the decision-making process on the engagement of the necessary forces (state and civilian entities) is presented.

The action from the air was coordinated through the competent state authorities (Civil Aviation Agency and the Air-Helicopter Unit of the Ministry of Interior of Montenegro) in order to obtain a complete picture from the ground about the scale of the fire, threatened infrastructure, and ships in the port of Bar. Coordination of water and land firefighting units on the ground was also carried out. The units were not able to completely extinguish the fire due to the impassability of the territory. The MUP's air helicopter unit was called in and successfully extinguished the fire from the air.

According to the scenario, during firefighting, the plane was damaged and fell into the sea. In accordance with its competencies and powers, the Joint Operations Team sent a fleet (SAR vessels of the Maritime Safety Administration, a patrol boat of the Border Police, and a fast boat of the Navy of Montenegro) to secure the accident site and secure search and rescue pilots. The area where the plane crashed was searched, the injured pilot was rescued, and the black box from the plane was found. The injured pilot was transferred to the port of Bar for further medical assistance. The competent authority for civil aviation approached the accident site to determine the cause of the accident.

The next presented activity was followed by the simulation of a fire at the transshipment installations of the oil terminal of the port of Bar and a fire and damage to a ship that was carrying out a fuel loading operation.

In this complex operation, the Joint Operations Team provided guidance to the OC on the use of all available national capabilities to:

- Preventing the spread of fire in the port of Bar,
- Rescue of ship crew members and their medical care,
- Prevention of possible spillage of fuel from the damaged ship into the sea,
- Remediation of damage caused in the waters of the port of Bar due to fuel and oil spillage,
- Repair of underwater damage in order to maintain the navigability of the damaged ship.

The Captain of the Port Authority Bar successfully coordinated the work of 14 state and civil entities in the Port's waters in accordance with the National Incident Response Plan. This concluded the planned demonstration of the force's capabilities for emergency interventions.

According to the activity plan, after the end of the exercise with the guests, a tactical-technical meeting was held in the Port of Bar and the means used in the interdepartmental exercise were presented, [17].

3.3 Analysis of the Exercise According To the Montenegro Navy Model

Within 45 days of the exercise, analytical documents were created and lessons learned were identified. According to the detailed instructions, each lesson contained: observations, discussion, conclusion, and recommendations, [21]. This most

contributes to obtaining elements for improving standard operating procedures. These two exercises were an excellent opportunity for representatives of different subjects to get to know each other and learn their roles in accordance with the plans for responding to incidents and pollution at sea. It was very important to coordinate the use of logistical and material capacities of different entities, and their subordination during the reaction to different scenarios. In addition, it served as an opportunity to test new technologies, such as the TETRA communication system [22], which proved to be very reliable, stable, and easy to use during the exercise.

Having complementary procedures and knowledge of NATO procedures, not only in the Navy but also in other maritime entities, will be extremely useful. NATO has been playing an important role in the field of civilian emergency response for twenty years. Euro-Atlantic Disaster Response Coordination Center - EADRCC has been established since 1998. EADRCC is NATO's main civilian emergency response mechanism, [23]. In case of major incidents and disasters at sea, Montenegro will be forced to seek international help from its neighbors, countries in the region, and NATO.

As mentioned, the Navy of Montenegro is the tactical level of command in the Army of Montenegro, and UPSUL is the operational level in the hierarchy of state institutions. What has not been done is that the model has not been evaluated with representatives of the strategic level: MSIP, Ministry of Defense, Ministry of Interior Affairs, Ministry of Spatial Planning and Foreign Affairs, so we do not have an assessment of the compliance of transferred obligations and correlation of organization and coordination of execution (higher order synergy effect). In order to establish a complete departmental framework, it is necessary to provide the Decision of the Government of Montenegro, as well as the Directives of the Ministry of Internal Affairs, Ministry of Interior, and Ministry of Interior.

It was established that the exercise fulfilled its goal and that the planning process was implemented in a new way. The time period in which the exercise was prepared and performed allowed all participants to familiarize themselves with the obligations of the National Emergency Plan and to perform the exercise.

3.4 SWOTH Analysis

After all these steps, a SWOTH analysis was made, [24]. The SWOTH analysis in this paper (Table 1, Appendix) provides an insight into the key strengths, weaknesses, opportunities, and threats of the model of interdepartmental exercises in the event of an incident at sea. A detailed analysis of this tool can provide a clearer insight into the areas that need to be improved and the opportunities that need to be taken advantage of to carry out these exercises more successfully.

3.4.1 Strengths

Specifications are set to cover all basic emergency tasks. This enables a clear identification of priorities in case of a crisis situation.

The legal framework supporting this type of exercise, as well as the reliance on NATO standards, provides international legitimacy and interoperability. The application of NATO standards helps standardize procedures and facilitates the joint work of different agencies, which is essential for successful operations.

The exercise is designed to improve interoperability between state bodies, which enables better-coordinated responses in crisis situations.

All relevant actors, from government authorities to public and private institutions, are involved in the exercise, ensuring that all parties are aware of their roles and responsibilities.

Full integration with the National Maritime Search and Rescue Plan and the National Marine Pollution Emergency Response Plan provides a legal basis for conducting exercises.

3.4.2 Weaknesses

Although there is a minimum legal framework, additional legal and organizational solutions are needed to enable the full implementation of the model. In particular, there is a lack of instructions for planning interdepartmental exercises at the national level.

The term "interoperability" is mostly used in a military context, and is not sufficiently recognized and integrated into civilian organizations. This means that some institutions may not have the proper training or understanding of this concept.

Not all participants of the exercise are adequately trained to apply the tasks according to the proposed model. This can lead to disruption of operations during actual incidents.

The criteria for the division of primary and secondary participants are not clearly defined, which can make the coordination and distribution of tasks difficult.

The costs of the exercises are not clearly shown, and each participant bears his own expenses, which can

make long-term planning and implementation of the exercises difficult.

3.4.3 Opportunities

There is a significant opportunity for further optimization and improvement of the model, especially through improving the quality of specifications and introducing new procedures in accordance with international standards such as ISO 9001/2016.

Expanding the institutional and legislative framework can help in better integration of civilian and military entities. Also, the introduction of regulations that are in line with international standards would enable the improvement of exercises and the introduction of advanced technologies.

Individual and joint logistics requirements can be clearly defined, and all participants can know costs and budget needs in advance, which would facilitate planning.

The development of instructions for organizing exercises at the national level would enable standardized planning and implementation of exercises in the future.

3.4.4 Threats

As the volume of maritime traffic grows, so does the possibility of incidents, which requires additional resources and constant adjustment of the model. Insufficient preparation can result in serious consequences in case of real incidents.

Administrative resistance to urgency and change can lead to delays in conducting exercises or improving models. This can compromise the ability to respond to emergency situations.

The ISO 9001/2016 standard ensures continuity of quality, so its non-implementation in key state institutions can jeopardize the success of the model.

If there is not enough political will to monitor the implementation of the exercises and take responsibility for the success of the model, there may be stagnation in its implementation.

Inadequate monitoring and justification of costs and logistics resources can slow down model development and reduce its sustainability.

The SWOTH analysis reveals the significant potential of the model but also points to critical areas that require improvement. The strengths of the model lie in its legal basis, international standards, and the comprehensiveness of the participants, while the weaknesses are mainly related to the lack of clear instructions, training, and a centralized budget. Opportunities are seen in the further improvement of the model and expansion of the institutional framework, while threats are mostly related to administrative problems and inadequate resources. The model can be of key importance for improving the capacity of Montenegro to respond to maritime incidents, but careful planning and support from all levels of government are needed to face the challenges that the threats bring.

4 Conclusion

The proposed multi-agency exercise model for search and rescue, as well as emergency response to sea pollution, has proven to be both practical and adaptable, especially in a challenging maritime environment like Montenegro. The research demonstrates the successful integration of military and civilian protocols, enhancing coordination between various entities, including the Navy of Montenegro, the Maritime Safety Administration, and numerous state bodies. Through the execution of real-world exercises, such as those conducted in 2019 and 2022, involving 36 national and international organizations, the model has validated its effectiveness in improving interoperability, optimizing resource allocation, and addressing gaps in institutional frameworks. Moreover, the model's adherence to NATO standards, bolstered by the use of advanced communication technologies like the TETRA system, has significantly enhanced the preparedness and operational efficiency of all participants, especially in scenarios involving search and rescue and pollution response.

This research adds to the existing body of literature by presenting a novel approach that merges military precision with civilian needs. It also highlights how smaller countries with limited resources, such as Montenegro, can scale and adapt their exercises for larger regional or international cooperation. The model offers a comprehensive framework not just for national drills but for collaboration with neighboring countries and NATO, addressing growing maritime risks stemming from increased traffic and environmental changes. Such collaborations will be crucial for Montenegro as it continues to strengthen its role in regional maritime security.

Additionally, the research identified several areas for future work. One of the most critical areas is the enhancement of the legal and institutional frameworks to ensure continuous improvement in training and exercise organization. Expanding the range of participating entities, both public and private, will be essential to foster a holistic approach to maritime security. Moreover, further development of training programs, particularly at

the strategic level, will ensure that all stakeholders—from command staff to field operators—are well-prepared to handle complex maritime emergencies.

The exercise model also revealed the need for more systematic post-exercise evaluations, incorporating lessons learned into future planning. By refining the process of analyzing exercise outcomes, Montenegro can enhance its operational readiness, adapting its response strategies to real-world challenges. Furthermore, the model's flexibility allows for more complex scenarios, such as large-scale open-sea exercises, which are yet to be fully explored. These exercises, once implemented, will provide invaluable experience in handling international incidents, especially those involving NATO forces and regional civilian entities.

In conclusion, the research confirms the validity of the proposed hypothesis: the exercise model meets the strategic and operational needs outlined in Montenegro's National Plans for Search and Rescue and Emergency Response. The model's scalability, flexibility, and compliance with international standards make it an indispensable tool for both national and international maritime operations. By addressing current gaps in coordination, resource allocation, and readiness, Montenegro is well-positioned to improve its maritime security capabilities and enhance its collaboration with regional and international partners. Moving forward, the continued refinement and expansion of this model will further solidify Montenegro's leadership in maritime safety and emergency response.

In summing up the facts about the reality and the exercise according to the Navy of Montenegro model, we see that in addition to all the difficulties that arose in the transition from the incomplete institutional and legislative framework for the exercise in the context of military rules and protocols, the very command and staff process of making decisions and orders for engaging and commanding the forces is contributed to the exercise. This exercise model is a "relatively speaking military" model for the execution of tasks from national plans, which has been implemented and can be counted on with greater success, both in this context and in the wider context of the events and extension of the exercise to neighboring countries.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

The authors wrote, reviewed and edited the content as needed and they have not utilised artificial intelligence (AI) tools. The authors take full responsibility for the content of the publication.

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APPENDIX

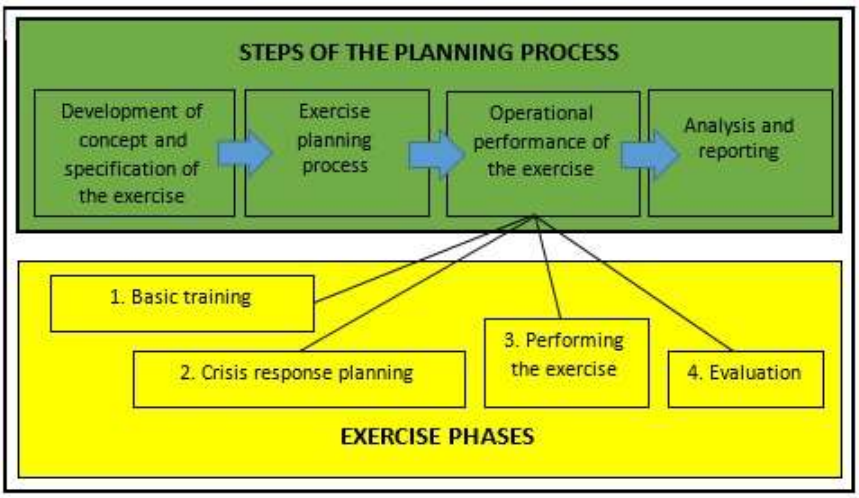

Fig. 1: Steps of the planning process and exercise phase

Fig. 2: Location of the exercise – Port of Bar Montenegro.

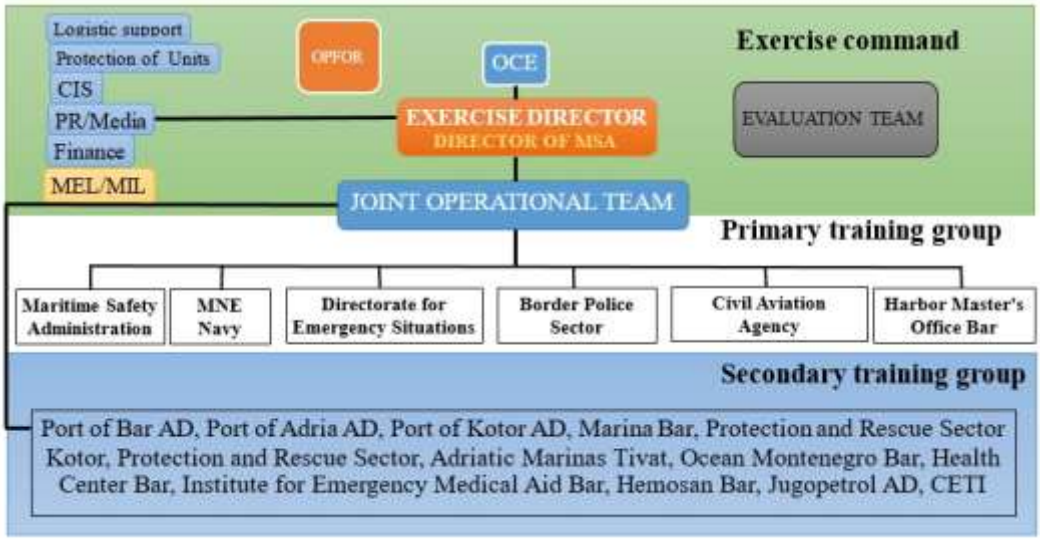

Fig. 3: Command structure of the exercise according to the Exercise Specification

Table 1. SWOTH Analysis

STRENGTHS	WEAKNESSES
1. The specification is broadly set, and the main tasks in emergency situations are highlighted 2. Legal framework for the structure of the specification 3. Organizational-legal model military and NATO standards 4. The aim of the exercise is to improve the interoperability of state bodies 5. Minimum scope of subjects 6. Content of the exercise, and general tasks. 7. The exercise is designed to be implemented through phases 8. All primary and secondary participants participate in this exercise. State bodies are primary, and economy and other social, state, and public organizations and institutions are secondary 9. MSIP's PR department provides regular information 10. Ad hoc covering of exercise costs	1. Full connection with National Search and Rescue Plan, and National Plan for Emergency Response in the Case of Pollution from Vessels, ISO 9001 2. The minimum legal framework has been established 3. Established minimum departmental framework (MSIP) 4. There is no national (military/civilian) Instruction for planning an interdepartmental exercise 5. "Interoperability" is a term for military defense-military institutions 6. Not all participants are trained to apply, act, and work according to the model. 7. Not all legally bound entities are included 8. Not all contents of the exercise are given 9. The model was not delivered to all participants 10. The division into primary and secondary participants was made without clear criteria 11. The PR service of the exercise has not been determined 12. Individual and joint needs and complete expenditures are not shown 13. All participants in the exercise bear their own expenses incurred during the planning process and the exercise implementation phase.
OPPORTUNITIES	**THREATS**
1. Improve the model 2. Improving the quality of the specification for the next exercise; 3. Establish the necessary institutional and legislative framework and supplement it with the necessary international and national regulations in accordance with the ISO 9001/2016 standard. 4. Familiarize all participants with the model. 5. Logistics should show individual and joint needs and complete expenditure 6. Improve the quality of the document, provide all the necessary data 7. Revise the list of primary and secondary participants 8. In addition to the planning team, the PR service of the Ministry of Transport should be engaged 9. Create Instructions for organizing the exercise	1. The growth of maritime traffic and the possibility of accidents; 2. Sluggishness of the administration and resistance to urgency; 3. Non-implementation of ISO 9001/2016 in the Maritime Directorate 4. Insufficient interest in a complex model 5. Insufficient knowledge and interest in improving the quality of a complex model 6. Absence of political will to supervise the exercise and distribution of obligations 7. Stall in the implementation of material bookkeeping, justifying the expenditure and expenditure of planned material logistics resources

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The authors equally contributed to the present research, at all stages from the formulation of the problem to the final findings and solution.

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Conflict of Interest

The authors have no conflicts of interest to declare.