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# MENTORING SEAFARERS FOR UNDERSTANDING MARITIME RISKS AND SAFETY CULTURE ON BOARD

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**Abstract:** For seafaring personnel, who are at the beginning of their maritime career on board ships, maritime companies provide informal guidance, which is part of the maritime tradition, within practical training courses/cadetship courses. Starting from the existing realities in the structure of seafaring personnel in the merchant marine, this paper presents the particularities of mentoring for a career in the maritime field. Among the aspects identified and highlighted in the mentoring process, the research focuses on the process of understanding maritime risks and the importance of safety culture on board ships, both by cadets and junior officers, who are at the beginning of their careers at sea. The investigation is based on a survey conducted on a significant number of subjects between 2018-2023. The developed research methodology was used to underlie the items in the questionnaires, on the basis of which the survey was carried out. The questionnaires were established by the data triangulation method and by consulting maritime stakeholders. Considering both the common aspects, specific to life at sea, but also the particular elements, which relate to the responsibilities on board the ship, the proposals received from all departments on board the ship were centralized. The questionnaires were developed based on the contributions received from: representatives of companies in the maritime industry, seafaring personnel at managerial and operational level (from the deck, engine and electrical departments), responsible in the field of risk and safety in the maritime industry, cadets and junior officers, at the beginning of their career at sea. The results of the survey were centralized, analyzed and interpreted to establish the level of understanding and perception of maritime risk and safety issues. The resulting conclusions can be used by the interested factors for the development and consolidation of appropriate, adapted and customized projects in the field of maritime safety and risk management on board ships, dedicated to cadets/ junior officers.

**Keywords:** mentoring seafarers, maritime risk, maritime safety culture, cadets and junior officers.

## 1. Introduction

Maritime transport is one of the essential elements of international trade, the specialized literature showing that currently between 80 and 90% of international trade is carried out by this means of transport [1]. In this

context, without the presence of seafarers on board merchant ships, maritime transport would not be possible, the global logistics supply chain would be interrupted, and the impact on daily life, anywhere on the globe, would be devastating. Under these conditions, seafarers represent an important sector on the international labor market, professionals who carry out an economic activity of high complexity.

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) requires seafarers to have skills, abilities and functional competencies at a specific minimum [2]. From this perspective, the internationalization of professional qualifications associated with maritime transport is a reality today, as reflected in the Seafarer Workforce Report 2021. Looking at the quantitative aspects, which reflect the degree of professional employment in this sector, the total number of seafarers, present in international maritime transport, is estimated in 2022 at 1,892,720 seafarers, of which 857,540 are officers and 1,035,180 represents non-certified personnel [3].

Romania's traditions in the naval industry and in maritime transport are recognized, these being an important economic sector in the last 50 years. In the conditions of the controversial disappearance of the national fleet, since the 90's, Romania has become an important supplier of seafaring personnel for the international maritime market [4]. Thus, in the records of the Romanian Naval Authority at the end of 2021, around 54.000 seafarers are registered, as given in Table 1.

Table 1 Romania - Statistical situation of certified seafaring personnel for the maritime and river sector

Crew category		No.	Total
<b>Crew for maritime sector</b>			
Junior officers (cadets)	-	3763	3.763
Seafaring Officers Operational Level	Deck officers	2.335	10.478
	Engine officers	2.755	
	Electrician and ETO (Electro Technical Officers)	5.388	
	Masters	4.120	
Seafaring Officers Managerial Level	Chief engineers	3.120	14.000
	Chief mates	4.140	
	2nd engineers	2.620	
Harbour maritime officers	-	1.201	1.201
Ratings	-	10.094	10.094
<b>Total crew for maritime sector</b>			<b>39.536</b>
<b>Crew for river sector</b>			
	River officers	4.555	14.783
	Ratings	10.205	
	Maritime Danube pilots	23	
<b>Total crew for river sector</b>			<b>14.783</b>
<b>Total crew for maritime and river sector</b>			<b>54.319</b>

As can be seen from this table, an important segment among the seafaring personnel in Romania is occupied by junior officers/cadets, recruited from among students and graduates of naval education. [5].

Garvey et al. all. shows that for those starting a career in any field, 50-70% of professional knowledge is acquired through forms of informal learning, the most effective of which is mentoring [6]. Given these conditions, for cadets at the beginning of their careers in the maritime field, who carry out practical training on board merchant ships, the stakeholders represented by the shipping companies provide informal guidance, which is part of the maritime tradition [7-8].

These companies promote best practice in maritime mentoring and maritime officers at operational level, at the beginning of their career.

As shown by Le Goubin, the experienced sailors, appointed by the company, are the ones who guide the junior personnel on board in the process of consolidating knowledge and in the development of practical professional skills and competencies [9].

The specific working conditions, existing on board the ships, the assigned professional responsibilities, at first basic responsibilities and later much more diverse and complex responsibilities, but also the associated psychological factors (high stress and fatigue levels, loneliness and unsociable hours) highlight the importance of an initial coordination from the ship's personnel. From this point of view, the existing initiatives in this field, present in the practice of maritime transport companies, are associated with mentoring in the professional and personal development of junior officers and cadets [10-11].

Of course, other arguments can be brought, based on which the safety culture on board is one of the important objectives pursued in the maritime mentoring process. The role of mentoring in the development and reinforcement of safety culture on board ships is highlighted by the sum of not only values, aptitudes, skills and competencies, but also the behavioral and group models promoted and implemented in the risk management of maritime transport. From this perspective, the research carried out in this paper is focused on investigating the role of maritime mentoring in the field of maritime safety culture development and risk management among junior officers/cadets and maritime officers at operational level at the beginning of their careers.

Considering the above context, the work is structured in the following sections: section 2 which presents the aspects that highlight the importance of mentoring for a career in the maritime field; section 3 presents the research methodology. The research results and their interpretation are presented in section 4 and the conclusions complete the paper in section 5.

The research was carried out within the internal projects carried out in the Naval Academy "Mircea cel Bătrân" in Constanța in the period 2017-2023, the project POCU/626/6/13/133383 - Innovative internships for the acquisition of skills in economic sectors with competitive potential and in the project 2021-1-RO01-KA220-VET-000029622 Seafarers Experiential Knowledge Based Mentors (Sea Mentors).

## **2. The importance of mentoring for a maritime career**

### **2.1 Literature review**

In Greek mythology, Homer described in the *Odyssey* that upon leaving for the Trojan War, the wise and brave Odysseus entrusts the protection and education of his son Telemachus to his best friend, Mentor [12]. Mentor takes it upon himself to protect, teach and develop Telemachus so that when his time comes, he will be ready to take on his role as leader. Later on, more than 2000 years later, at the end of the 17th century, François de Salignac de la Mothe-Fénelon in the poem "Les Aventures de Telemaque" offers an example of spiritual education by evoking Mentor's contribution to the training and development of Telemachus [13-14]. Through this addition, Fenelon promoted, through Homer's famous work, the principles of pedagogy and the importance of the relationship between teacher and student. From this perspective, we can say that Fenelon is the one who first introduced the notion of a *mentor*. For Fenelon, the mentor is the one who teaches and who contributes to the formation and development of the one who is taught, *protégé* [14].

While Fenelon mentioned, more than three hundred years ago, the term mentoring, in recent years the specialized literature but also professional experiences from various sectors of activity highlight this term

associated with the learning relationship. While Kramer-Simpson shows that this relationship focuses on the long-term development of a person's career, which in most situations is supported by the mentor, who is the person with experience [15], Dashper and Aliu, J. & Aigbavboa emphasize that the main purpose of mentoring is to encourage the professional and personal experiences of the one being taught and trained, by training, developing and strengthening knowledge, skills and abilities, competences and attitudes. [16-17].

On the other hand, in many papers the terms mentoring and coaching are used in a similar context, generating a state of confusion for the potential reader. In Lancer's opinion, even if these terms are similar, by definition contributing to the professional and personal development of a subject, each separately implies different approaches [18].

Bjursell & Sädbom show that mentoring involves a relationship that is established over the long term, which is mainly directed to support the growth and development of a person in a certain area [19]. Turner et al. all and Okolie et. All. state that the mentor becomes a permanent source of inspiration and support, with the mention that the mentor cannot permanently observe all the specific actions carried out by the subject and consequently cannot provide permanent counseling, including changes in behavior in daily work day [20-21].

At the same time Garvey et. all highlights the concept of coaching through a relationship of finite duration, mainly emphasizing both the consolidation and elimination of specific behaviors in the present, in order to increase the performance of the subject [6]. Other authors state that while mentoring provides long-term, high-level coordination, coaching can provide immediate performance improvement in some areas, with some limitations in others [22-24]. Tkach & DiGirolamo mention that mentoring and coaching require particular approaches depending on the field in which they are applied [25].

Starting from this observation, international maritime transport stands out as a complex economic sector in which, in addition to the aspects associated with the required professional skills and competences, there are also those related to the working conditions on board during voyages [26]. If is added to these the permanent multi-cultural interaction, present both in the work relations on board the ship and in the contacts that the seafaring staff have with the other representatives of the global logistics chain (seaports, authorities in the field, maritime service providers etc) is obtained the diagram of the requirements for the minimum level of training of seafarers [27]. Since the training of these skills and competencies from the beginning of the career is necessary and mandatory, mentoring in the maritime field is a direction that needs to be deepened by both shipping companies and education providers [28-29].

## **2.2 Mentoring Seafarers**

Since ancient times, mentorship has been an integral part of maritime culture, with the ship's captain traditionally being the "enlightened mentor" by each member of the crew. The literature highlights the importance of mentoring in the maritime industry, mentoring being the established method of supporting based learning on the principle of knowledge transfer, development and consolidation of skills and practical skills among junior seafarers, at the beginning of their careers [29-33].

Maritime experience shows that the most effective way to ensure a safety climate on board is to build a permanent mentoring system, through which good maritime practices are transferred from one generation to another [34]. Le Goubin shows that promoting mentorship in the global merchant fleet has a number of advantages: increasing the degree of professional confidence of the crew and promoting good practices, strengthening the culture of maritime safety, increasing the degree of cohesion of the crew, strengthening the sense of belonging to the company' values, low cost-benefit ratio etc. [9].

Kathy Kram is known as one of the first authors to define the action and benefits of the mentoring process. Kram summarized that in maritime field mentoring is represented by a two-way function of trust established between mentor and cadet for the purpose of career enhancement and personal development [35]. From a pragmatic perspective, applied to the field, it is highlighted that the term mentoring has various meanings thus the author prefers to use the term "development relationship".

The analysis of the practices in the field shows that on board the ship the transfer of knowledge related to experience (experiential knowledge) is supported by the seafaring staff through mentoring provided by the experienced crew members in order to improve the learning cycle and form the functional action skills required by STCW. Kram & Isabella state that 75% of the skills required for any job are not acquired in the classroom or in a formal training process. In this context, the specialized literature that belongs to the main stream of publications in the maritime field shows that these skills can be associated with the consolidated transition process of graduates from school to working life, which is most often associated with practical training courses during the period of initial training on board the ship [9, 36].

In this process the candidate for a career in maritime transport will also have the opportunity to understand the importance of the weak points and vulnerabilities associated with the chain-of-events for accidents specific to the activities carried out on board ships. Given that between 75-95% of maritime accidents and incidents are caused by the human factor, mentoring is one of the options for both understanding maritime risks and associated impacts and for their management [37].

Starting from the aspects presented in the specialized literature, from the formal mentoring schemes applied in the maritime field the following objectives can be identified: the development of a high level of knowledge in the maritime field; training in maritime safety and security and associated risks; development and strengthening of skills and competencies in the use of on-board systems and equipment. [31, 38].

### **2.3 Maritime safety and risk management in maritime mentoring**

As mentioned above, the issues of maritime safety and security as well as the risks associated with the activity carried out are topics of maximum priority in formal mentoring schemes in the maritime field [28, 39]. Thus, these schemes aim to train, develop and strengthen the skills, competencies and attitudinal values of junior officers/cadets and maritime officers at operational level, at the beginning of their careers [40].

Studies show that in the case of seafaring personnel, the perception and responsibility towards risk are dependent on several factors: professional experience, positive attitude, personal expectations, courage, safety culture [41]. In the case of personal expectations, studies highlight several particularly interesting aspects for the maritime field: maritime community membership, experience in the company, work tasks and responsibilities that must be fulfilled, the perspective of financial security etc. [42]. Another aspect often mentioned is multi-culturalism, which is an international characteristic when talking about crew. Cultural differences among seafarers can have an impact on interpersonal relations and implicitly on maritime safety and risk management [43].

Consequently, in all these situations, for the activity to be carried out, when there are indications that negative consequences may occur on the achievement of the objectives, specific measures are established in order to solve the problems generated by the specific risks.

In the same context, existing practice on board ships shows that risk perception and responsibility are the determining elements on the basis of which junior officers/cadets and early career maritime officers at the operational level carry out a safe activity on board the ship and manage risks.

Under these conditions, it is necessary to determine the extent to which junior seafarers currently perceive this particularly complex issue: maritime safety and maritime risks. In order to fulfil this objective, a unitary, systematized, rigorous scientific approach is necessary, based on a research methodology, which ensures the identification of the elements that contribute to the development of the maritime safety culture and to an efficient and effective risk management by junior seafarers, who are at the beginning the career.

### **3. Research methodology: Data collection and processing methods for establishing safety-risk questionnaires**

In the first stage of the research, the questionnaires were developed on the basis of which the perception of junior seafarers on maritime safety and the risks associated with the activity on board ships will be established.

In order for these questionnaires to reflect as faithfully as possible the realities of life at sea, in the process of their elaboration, data and information from several sources will be combined, so that the obtained questionnaires reflect the subject of the assessment, maritime safety and maritime risks, as well as the elements that highlight the perception of these two concepts by junior seafarers.

From a methodological point of view, in order to solve a problem, it is necessary to analyze it from several perspectives. Also, it is recommended to use the data triangulation method which also contributes to improving the quality of the results.

The data triangulation method involves the use in qualitative research of several sources of data and information in order to comprehensively understand a problem or a phenomenon [44-45].

In the approach carried out, the research team followed Denzin's technique [46], on the basis of which it collected and processed the necessary data for the development of the safety-risk questionnaires, by:

- (1) data triangulation in a single study, data obtained from multiple sources based on literature review;
- (2) triangulation of preliminary investigators: using experiences, observations and recommendations received from stakeholders involved in maritime transport activities;
- (3) triangulation of experts in the field: critical analysis of the results obtained in stages (1) and (2) and establishing the questionnaires in their final form.

Based on the above-mentioned aspects, the triangulation method was adapted and later structured in 3 stages: MS-MR-SCb1, MS-MR-SCb2 and MS-MR-SCb3, as shown in Figure 1.

**MS-MR-SCb1 - Literature review.** In the first stage, the bibliographic research was carried out, resulting in a synthesis of the information present in the specialized literature regarding the contributing elements for the formation of the maritime safety culture and for an efficient and effective risk management among junior seafarers, at the beginning of their careers, main beneficiaries of maritime mentoring. The main works present in the specialized literature, which belong to the main stream of publications for understanding the role of mentoring in the formation of a correct attitude towards risk and maritime safety, were consulted. The conclusions of the analysis and the resulting materials were subsequently used as the basis of the discussions held during the MS-MR-SCb2 stage and for the preliminary development of questionnaires 1 and 2.

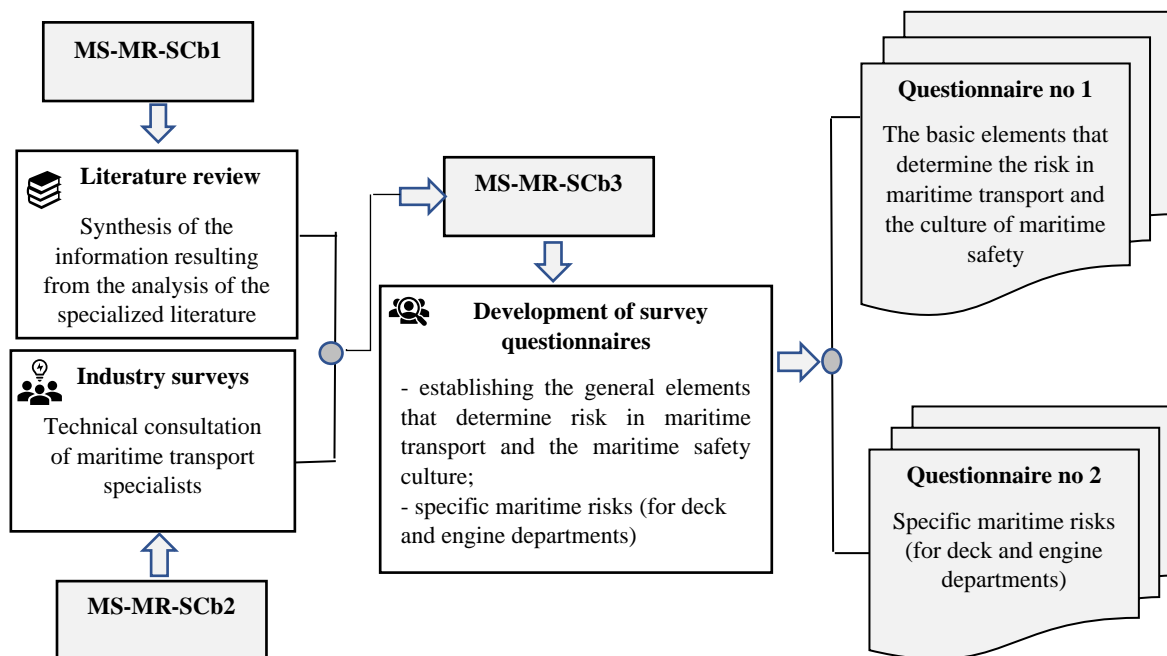


Figure 1. Mentoring Seafarers - Maritime Risks - Safety Culture on board (MS-MR-SCb) - the use of the triangulation method for developing questionnaires

**MS-MR-SCb2 - Industry surveys.** In this stage, the technical consulting of maritime transport practitioners took place, in formal and informal meetings, regarding the role of maritime mentoring in the development of maritime safety culture and risk management. Representatives from both the "Employers and Managers" and the "Employees and Cadets" categories were present in these meetings. From the first category, representatives of shipping companies, including managerial level seafaring staff and those responsible in the field of risk and safety in shipping attended, summing up 22 participants. From the second category, 28 participants attended the meetings, represented by junior officers/cadets and maritime officers at the operational level at the beginning of their careers. Each round of discussions was led by an expert, who organized and led the debates according to the following directions: presentation of the purpose of the research; presentation of the synthesis obtained during the MS-MR-SCb1 stage; obtaining points of view and proposals for the development of questionnaires 1 and 2. Following this stage questionnaires 1 and 2 results from the previous stage were completed, updated and organized in a technical report of the MS-MR-SCb2 stage which will be used in the MS-MR-SCb3 stage.

**MS-MR-SCb3 – Development of questionnaires.** The aim of this stage of the research is to develop the two questionnaires Mentoring Seafarers - Maritime Risks - Safety Culture on board (MS-MR-SCb). The preliminary results obtained in the first two stages MS-MR-SCb1 and MS-MR-SCb2 were analyzed by an expert committee. In the selection process of the experts who established the expert committee, the following requirements were taken into account: experience in maritime transport (with an emphasis on the safety-risk issue); experience in the field of maritime mentoring; availability to participate in consulting meetings.



From this perspective, the MS-MR-SCb3 expert committee consisted of 10 experts with theoretical and practical experience in maritime transport: 5 Masters, 4 chief engineers who have mentoring duties within the companies; 1 full professor with expertise in maritime risk and safety. Two junior officers (deck and engine), at the start of their career, participated as observers. None of the members of this team participated in the MS-MR-SCb2 module.

The debates took place in the form of individual and separate consultations, for deck and engine department and a joint final meeting, all meetings taking place in 2018.

Results:

- Questionnaire 1 bringing together the general elements that determine risks in maritime transport and maritime safety culture, Annex 1;
- Questionnaire 2 where specific maritime risk factors are presented (for deck and engine departments).

During each round of discussions, the nominated expert facilitated creativity, alongside with the increasing number of ideas, identifying the relevant elements for risks in maritime transport and for the maritime safety culture - Questionnaire 1. Later on, for each source of risk, the risk factors were identified and detailed, with interpretations of the causes and maximum foreseeable consequences from the perspective of the level of probability/frequency and the level of severity/gravity - Questionnaire 2.

In the next phase of the research, the two questionnaires were applied to junior sailors in the period 2018-2023, during the study period related to each academic year. Only the graduates of the "Mircea cel Bătrân" Naval Academy, who were at the beginning of their careers, responded to the surveys (completion of the two questionnaires). At the time of filling in the survey, they had the following professional status in the world maritime fleet: (a) junior officer/cadet; (b) maritime officer at operational level.

Also participating in the survey, there were maritime officers at operational-level who had more than 12 months of seagoing experience, even though their skills and competencies in the field of maritime safety and risk management are considered to be already formed. The argument underlying this decision results both from IMO recommendations in the field of maritime safety but also from the policies of maritime transport companies, which through their mentoring schemes implemented on board contribute to strengthening the safety culture [47-48].

The results of the surveys were centralized, analyzed and interpreted in order to establish the level of understanding and perception of maritime risk and safety issues.

Since the project 2021-1-RO01-KA220-VET-000029622 Seafarers Experiential Knowledge Based Mentors (SeaMentors) is ongoing, only the results related to Questionnaire 1 (Annex 1) will be presented and interpreted. The results related to Questionnaire 2 will be presented in a future paper.

#### **4. Research and Discussion**

On March 15, 2023, out of a total of 400 questionnaires distributed between January 2018 and February 2023, 316 questionnaires were validated, as follows: 178 from the deck department (21% women and 79% men) and 138 from the machine department (100% male), Figure 2.

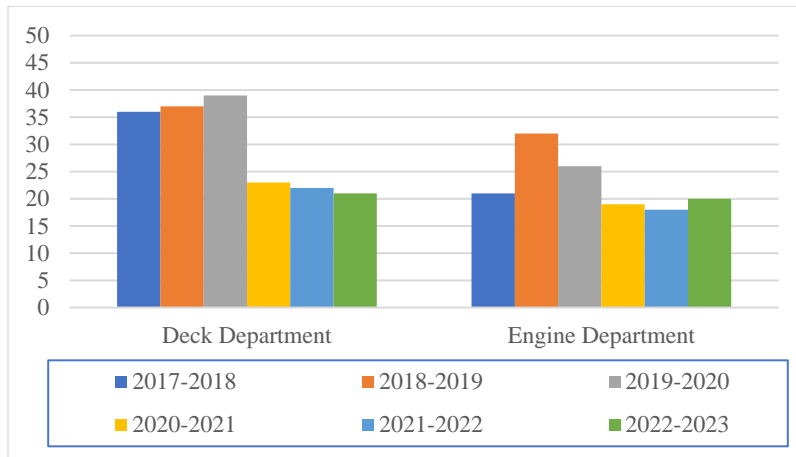


Figure 2. Numerical distribution of respondents by department (deck/engine)

Relating the 316 valid questionnaires to the occupational status that the respondents have on board the ship, Figure 3, 156 questionnaires were filled in by junior officers/cadets (97 deck cadets and 59 engineer cadets), 151 by maritime officers at operational level (79 deck and 72 engine) and 9 represent other positions in the world fleet.

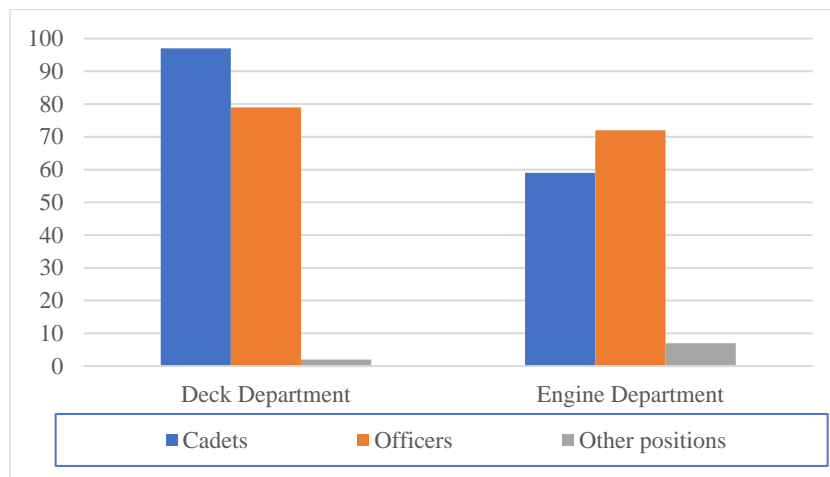


Figure 3. Professional status on board the ship at the time of the survey

As stated above, in the conducted research, the 2 questionnaires were filled in only by the graduates of the "Mircea cel Bătrân" Naval Academy, who were at the beginning of their careers, their distribution by age groups being presented in Figure 4 and in the Table 2.

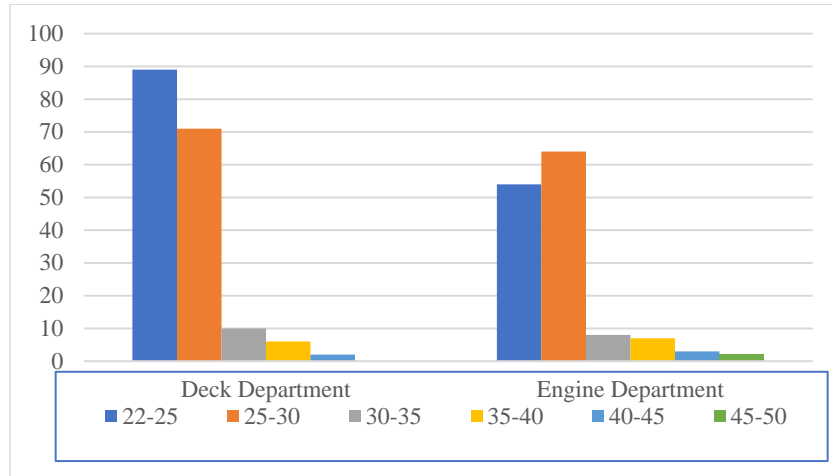


Figure 4. Age of respondents at the time of the survey

Table 2. Age of respondents at the time of the survey

Age	22-25 years	25-30 years	30-35 years	35-40 years	40-45 years	45-50 years	Total
Deck Department	89	71	10	6	2	-	178
Engine Department	54	64	8	7	3	2	138
Total	143	135	18	13	5	2	316

In Questionnaire 1, after highlighting the general information regarding the respondents (age, professional status on board the ship), from the next set of questions the information about their place of work results: department (deck/engine), type of ship, experience at sea, etc.

Through the third set of questions, the junior seafarer's perception of risk was investigated through the according to their professional experiences during the voyages.

The obtained results and their interpretation are detailed below.

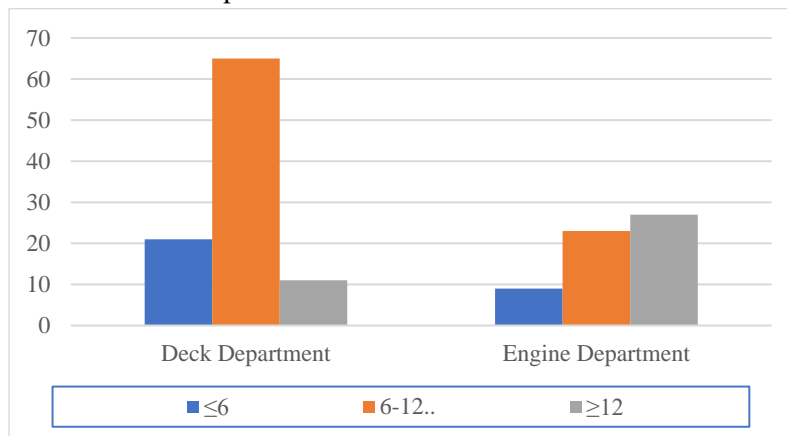


Figure 5. Junior Officer/Cadet - Professional experience by position at the time of survey application (in months)

The professional experience of the junior officers/cadets, at the time of the application of the survey (in months), is reflected in Figure 5. Out of the 156 respondents, approximately 19% of them have less than 6 months at sea (21 deck cadets and 9 engine cadets). At the same time, 88 of the cadets (56%) made at least 2 voyages (period of 6-12 months) and 38 of them have a boarding period of over 12 months (11 deck cadets and 27 engine cadets), in process to obtain the deck/engine officer license.

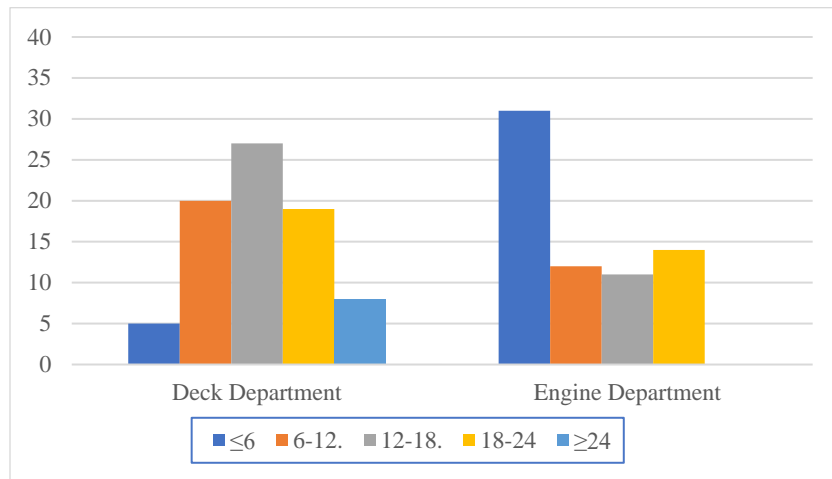


Figure 6. Maritime Officer at Operational Level - Professional experience at sea at the time of survey (in months)

From the same point of view, in the case of operational level officers, the situation is presented in Figure 6.

Out of the 151 respondents, approximately 36 officers, 24% of the respondents, had less than 6 months at sea (5 deck officers and 31 engine officers). At the same time, 32 of the respondents (20 deck officers and 12 engine officers) had a period of between 6-12 months at sea. More than 54% of operational level officers had between 12 and 24 months at sea (83 officers – 54 deck officers and 29 engine officers).

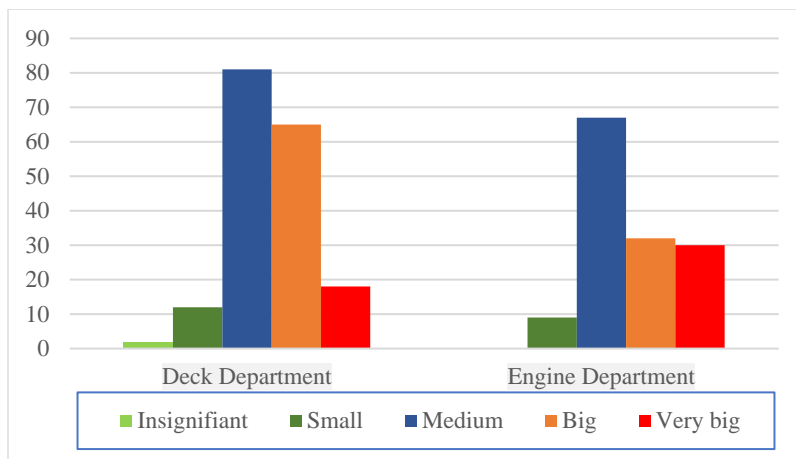


Figure 7. The level of risk perceived by the respondent during the time at sea

As mentioned, the main purpose of the research is, on the one hand, to establish the perception that junior seafarers, who are at the beginning of their career at sea, have on maritime safety and risk, and on the other hand, to identify the problems that can be solved in this field through maritime mentoring.

Studies carried out from the perspective of risk management in maritime transport show a large number of sources, causes and factors that can lead either to work accidents with greater or lesser consequences, to catastrophic fires or explosions or to massive pollution, that sometimes mean big ecological disasters. In this manner, the issues of risk and maritime safety are priority objectives in the mentoring schemes from the maritime field.

The young seafarer at the beginning of his career at sea, whether he is a junior officer/cadet or an operational level officer, perceives risk differently, based on the knowledge acquired and often through the his own experience at sea. The level of risk perceived by the respondent during the sea phase is presented in Figure 7. While only 23 of the 316 respondents (under 7%) perceive the risk to which they are exposed during the sea phase as negligible or small, 148 of them (47%) in an equal percentage from both deck and engine departments, characterize the risk level as medium. Almost 46% of the participants, 145 respondents, rate the level of risk as high or very high. In this case, the highest percentage corresponding to this level of risk belongs to maritime officers at the operational level (over 67%). This aspect shows that the empowerment through the work tasks assigned and carried out on board by maritime officers at the operational level leads to the awareness of the risks and the understanding of the need for a safety climate on board. The same conclusion results from Figure 8, which shows the perception of the safety climate during the time at sea.

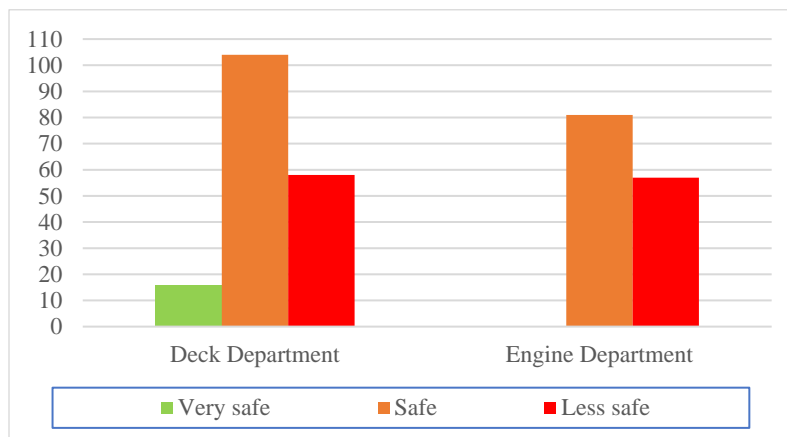


Figure 8. Perception of the safety climate during the time at sea

Even if more than 63% of respondents rate the safety climate on board as safe or very safe, around 37% of respondents believe that there is still room for improvement.

When the risk analysis is carried out punctually, opinions begin to differ, the type of ship being the one that dictates the perception of possible dangers. In the case of fire/explosion risk, in Figure 9 can be observed that 152 of the respondents (48%) consider this risk to be at medium level. Those who work on tankers or those in the engine department assess the level of fire/explosion risk as high or very high (150 respondents, 47%).

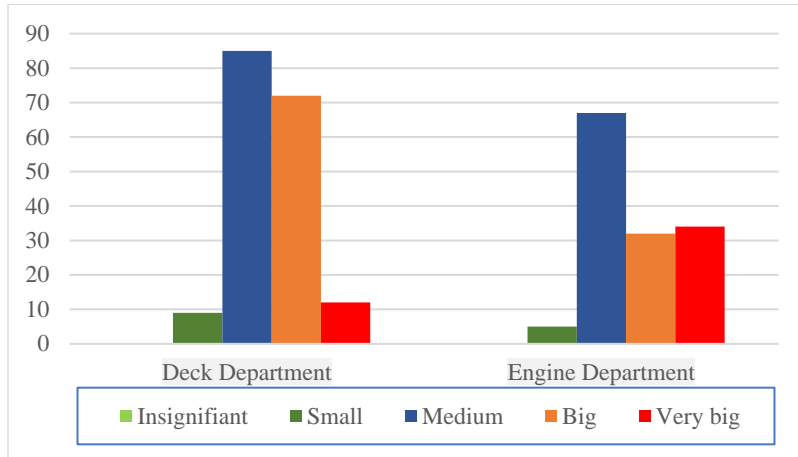


Figure 9. The level of fire/explosion risk as perceived by the respondent on board the ship

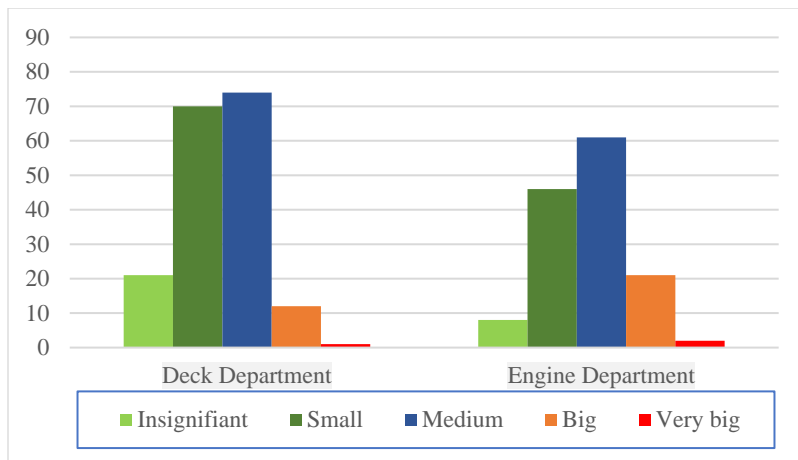


Figure 10. The level of pollution risk (any form of pollution) as perceived by the respondent on board the ship

Similarly, following the analysis of the results, presented in Figure 10, it appears that the level of pollution risk perceived by the respondents for the activities on board the ship has a similar distribution, 46% of the respondents rate it as negligible or small. Surprisingly, the level of pollution risk is perceived as very high by less than 1% of those interviewed, even if a good part of them works on tankers. The risk level of this item was rated as medium by 135 respondents while 33 of the respondents consider it high.

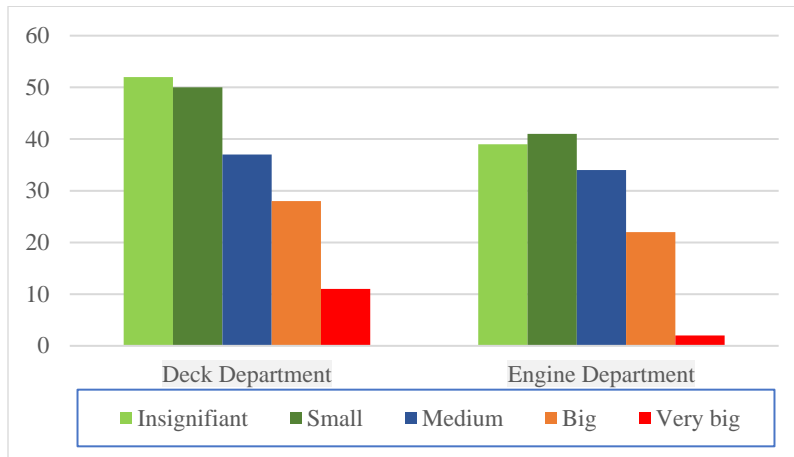


Figure 11. The level of risk of terrorist attack/piracy as perceived by the respondent on board the ship

The survey regarding the risk of terrorist attack and piracy is presented in Figure 11. The results obtained show the fact that 20% of those surveyed rate this risk as high and very high. From the data filled in the questionnaires and from the face-to-face interviews, it appears that those who gave this qualification made part of the trips in the risk areas: West Africa (Ivory Coast, Liberia) and East Africa (coasts of Somalia, Gulf of Aden).

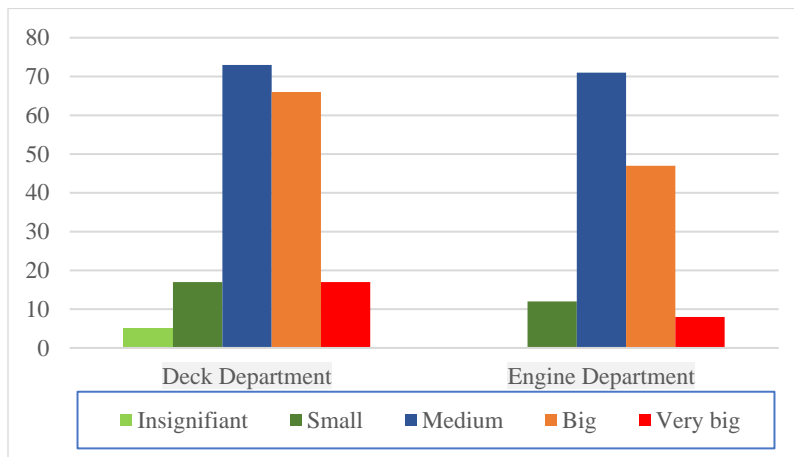


Figure 12. The level of work accident risk as perceived by the respondent on board the ship

Given that work accidents are present in maritime transport Figure 12 reflects the view of the 316 respondents on this issue. The level of work accident risk is perceived as high and very high by 138 (44%) respondents (83 deck, 55 engine). The medium level is appreciated by 144 (46%) respondents (73 deck, 71 engine) while 34 (11%) of them consider this risk as small or negligible.

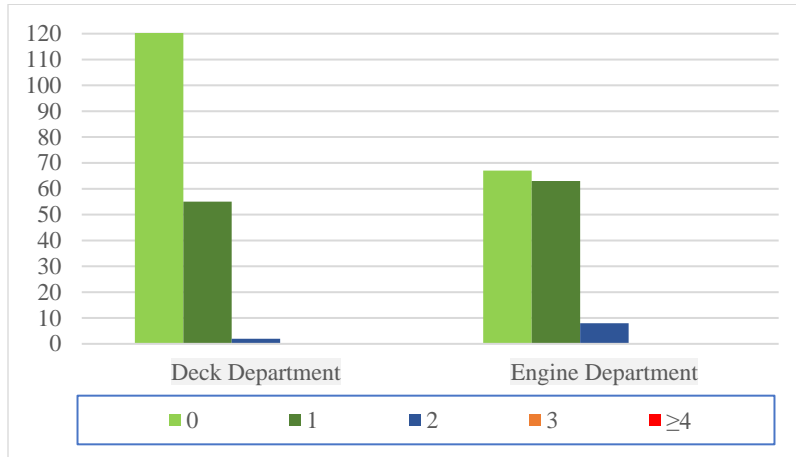


Figure 13. The number of minor accidents during the time at sea

Related to the issue presented above in Figure 13 are highlighted the number of minor accidents that the interviewed persons had during the time at sea. While 188 respondents (60%) stated that they had no minor accident, 118 (37%) had one accident and 10 (3%) respondents stated that they had 2 minor accidents. It is interesting to note that those who had one or two minor accidents gave high and very high level to the item *The level of risk perceived by the respondent during the time at sea*.

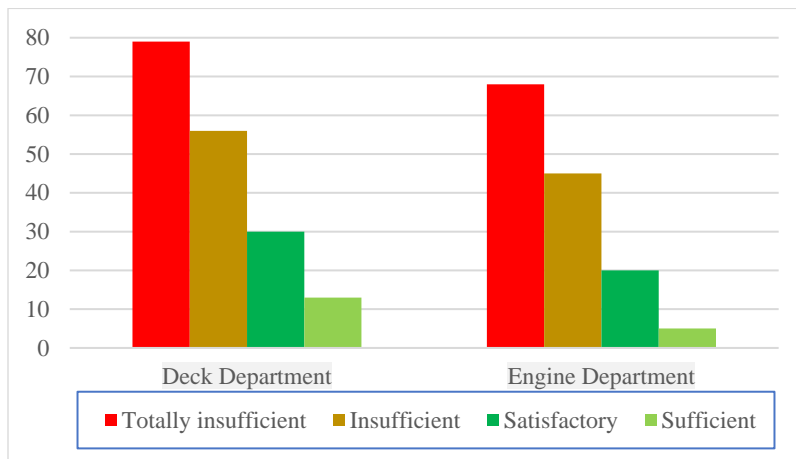


Figure 14. The time allowed for rest during the time at sea

The issue of rest time is a sensitive issue in maritime transport, Figure 14. Even though the participants in this survey are at the beginning of their careers, the issue of sleep, rest time were mentioned as important and priority issues in the discussions after filling in the questionnaires. In this manner, 248 respondents (78%) assessed that the time allowed for rest during the sea phase is totally insufficient or insufficient (135 deck, 113 engine) and only 68 respondents (22%) assessed that this time is satisfactory or sufficient.



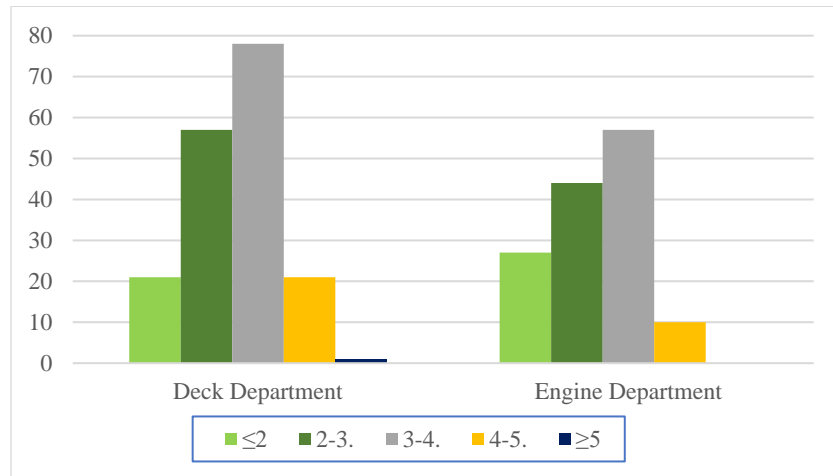


Figure 15. Optimal duration of a sea phase according to the respondent (in months)

Given the complexity of the activities carried out on board ships, the isolation, the work tasks performed and the other social aspects present during life at sea, the optimal duration of a sea phase is an aspect that needs to be clarified. Although the approach to this problem is to a certain extent subjective (the respondents are at the beginning of their careers), the authors of the research present, without interpreting them, the results obtained, Figure 15.

## 5. Conclusions and future research directions

The research conclusions can be used by the interested factors for the development and consolidation of appropriate, adapted and customized projects and actions in the field of maritime safety and risk management on board ships, dedicated to cadets and young officers. Since the research is an integral part of the ongoing project 2021-1-RO01-KA220-VET-000029622 Seafarers Experiential Knowledge Based Mentors (SeaMentors), in this paper only the results related to Questionnaire 1, through which they were established the general elements that determine risk in maritime transport and maritime safety culture (Annex 1), were presented.

The results of Questionnaire 2, through which the specific maritime risks (for deck and engine departments) were assessed, will be presented in a future paper.

As mentioned, the main purpose of the research is, on the one hand, to establish the perception that young seafarers, who are at the beginning of their career at sea, have on maritime safety and risk, and on the other hand, to identify the problems that can be solved in this field through maritime mentoring.

The risk and maritime safety and risk management have utmost important in the maritime business. These issues should be priority objectives in mentoring schemes in the maritime field

The risk questionnaires were developed based on a research methodology that ensures the identification of elements contributing to the development of the maritime safety culture and to an efficient and effective risk management by young seafarers, who are at the beginning of their careers. In this manner, the authors propose the use of the triangulation method for the development of the Mentoring Seafarers - Maritime Risks - Safety Culture on board (MS-MR-SCb) questionnaires.

From the answers given to the questionnaires, it appears that the young seafarer at the beginning of his career perceive the risk differently, both through the acquired knowledge and through that of his own experience at sea. The research carried out shows that accountability through the work tasks assigned and carried out on board by the maritime officers at the operational level leads to the awareness of the risks and the understanding of the need for a safety climate on board. The surveyed young seafarers highlighted the fact that the development of technical skills in the mentoring process is a priority. For these reasons, the authors of the research emphasize that a sustainable mentoring scheme should also include non-technical skills, including the need to identify and be aware of risks, to strengthen the maritime safety culture. The results of the surveys show that when the risk analysis is carried out punctually, the opinions of the respondents begin to differ, the type of ship and the workplace (deck department or engine department) being the ones that dictate the perception of possible dangers: fire, explosion, pollution, work accident etc. Another aspect worth mentioning is the fact that in many situations the complexity of the activities carried out on board ships, the work tasks performed and the social aspects present during life at sea are factors that influence the safety climate and attitudinal values towards risk among young seafarers. Therefore, in future efforts, the research will focus on the analysis of the specific maritime risk factors (for the deck and engine departments), identified in Questionnaire 2.

Participants in this research share the idea that maritime mentoring is an efficient and effective form of developing and strengthening skills, competencies and attitudinal values in the field of maritime safety culture and risk management.

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## References

- [1]. Review of Maritime Transport 2022  
[https://unctad.org/system/files/official-document/rmt2022overview\\_en.pdf](https://unctad.org/system/files/official-document/rmt2022overview_en.pdf)
- [2]. Fotteler, M. L., Andrioti Bygvraa, D., & Jensen, O. C. (2020). The impact of the Maritime Labor Convention on seafarers' working and living conditions: an analysis of port state control statistics. BMC public health, 20(1), 1-9.
- [3]. Seafarer Workforce Report, 2021 Edition  
<https://www.ics-shipping.org/publication/seafarer-workforce-report-2021-edition/>
- [4]. Tița Călin, 2021. Câți navigatori are România și câți reușesc să plece pe mare? Cuget Liber, 29 noiembrie 2021  
<https://www.cugetliber.ro/mobile/stiri-economie-cati-navigatori-are-romania-si-cati-reuesc-sa-plece-pe-mare-443425>.
- [5]. Nicolae F., Popa, C., Ristea M., Beizadea H. The E-learning Particularities for Maritime Training and Education. Study Case on Training Simulator for Integrated Ship Management, The 9th International

Scientific Conference eLSE „e-Learning and Software for Education”, National University of Defence, ISSN 2066-026X-13-148, pg.250-255, Bucharest, Romania, April 25-26, 2013 – indexed in ISI Proceedings of Web of Knowledge, EBSCO bibliographic database, Scientific Publications Index, Scientific Resources Database, Central and Eastern European Online Library.

[6]. Garvey, R., & Stokes, P. (2021). Coaching and mentoring: Theory and practice. SAGE Publications Ltd. ISBN 978-1-5297-4077-6.

[7]. Narayanan, S. C., Emad, G. R., & Fei, J. (2023). Theorizing seafarers' participation and learning in an evolving maritime workplace: an activity theory perspective. *WMU Journal of Maritime Affairs*, 1-16.

[8]. Elashkar, M. A., & Farag, S. E. (2015). A New Tool for Mentoring, Transfer of Experiential Knowledge and Evaluation to Understand The Colregs And Their Application At Sea. *International Journal of Humanities and Social Sciences (IJHSS)* 4. 1, Jan 2015, 49, 56.

[9]. Le Goubin, A. L. (2010). Mentoring and the Transfer of Experiential Knowledge in Today's Merchant Fleet. *TransNav, International Journal on Marine Navigation and Safety of Sea Transportation*, 4(1).

[10]. Estimo, E. Ship to Academe, Seafaring to Teaching: Seafarer Teachers in Maritime Higher Education Institutions in the Philippines.

[11]. Felisilda Jr, A. C., Cañas, J. R., & Maluya, R. M. (2019). Continual improvement of the peer mentoring program in the marine engineering department. *IJAR*, 5(10), 145-148.

[12]. Le Brun, J. (2009). Les aventures de Télémaque: destins d'un best-seller. *Littératures classiques*, (3), 133-146.

[13]. Martine, J. L. (2009). Morale et poétique dans Les Aventures de Télémaque.

[14]. Cristian Neguț, 2021. Cine este Mentor? - Learning Ecosystem. <https://learn-me.ro/blog/cine-este-mentor/>

[15]. Kramer-Simpson, E. (2018). Moving from student to professional: Industry mentors and academic internship coordinators supporting intern learning in the workplace. *Journal of Technical Writing and Communication*, 48(1), 81-103.

[16]. Dashper, K. (2020). Mentoring for gender equality: Supporting female leaders in the hospitality industry. *International Journal of Hospitality Management*, 88, 102397.

[17]. Aliu, J., & Aigbavboa, C. O. (2021). Structural determinants of graduate employability: impact of university and industry collaborations. *Journal of Engineering, Design and Technology*, 19(5), 1080-1100.

[18]. Lancer, N., Clutterbuck, D., & Megginson, D. (2016). Techniques for coaching and mentoring. Routledge.

[19]. Bjursell, C., & Florin Sädbom, R. (2018). Mentorship programs in the manufacturing industry. *European Journal of Training and Development*, 42(7/8), 455-469.

[20]. Turner, T., Lucas, M., & Whitaker, C. (2018). Peer supervision in coaching and mentoring: A versatile guide for reflective practice. Routledge.

[21]. Okolie, U. C., Nwajiuba, C. A., Binuomote, M. O., Ehiobuche, C., Igu, N. C. N., & Ajoke, O. S. (2020). Career training with mentoring programs in higher education: facilitating career development and employability of graduates. *Education+ Training*.

[22]. Gorokhova, A. E., Gaisina, L. M., Gareev, E. S., Shutov, N. V., & Shakirova, E. V. (2018). Application of Coaching Methods at Agricultural and Industrial Enterprises to improve the Quality of Junior Specialists' Adaptation. *Quality-Access to Success*, 19(164).

- [23]. Connor, M., & Pokora, J. (2017). EBOOK: Coaching and Mentoring at Work: Developing Effective Practice: Developing Effective Practice. McGraw-Hill Education (UK).
- [24]. Passmore, J., Krauesslar, V., & Avery, R. (2015). Safety coaching: A literature review of coaching in high hazard industries. *Industrial and Commercial Training*, 47(4), 195-200.
- [25]. Tkach, J. T., & DiGirolamo, J. A. (2020). The state and future of coaching supervision. *Coaching Researched: A Coaching Psychology Reader*, 23-41.
- [26]. Felisilda, A. C., & Malaga, A. N. (2019). Peer mentoring in the full mission deck. *IJAR*, 5(9), 143-146.
- [27]. Felisilda Jr, A. C., Cañas, J. R., & Maluya, R. M. (2019). Continual improvement of the peer mentoring program in the marine engineering department. *IJAR*, 5(10), 145-148.
- [28]. Allen, C. L. (2022). Seafarers' Descriptions of the Influence of Non-Technical Skills Training within Maritime Safety (Doctoral dissertation, Grand Canyon University).
- [29]. Zavalniuk, O., Nesterenko, V., Zavalniuk, I., & Doshchenko, H. (2021). A key component of continuing
- [30]. Bastoulis, A. (2022). The demographic composition of manpower of the maritime industry (Master's thesis, Πανεπιστήμιο Πειραιώς).
- [31]. Mni, O. Z., Mni, V. N., Zavalniuk, I., & Doshchenko, H. (2021). A key component of continuing professional development in the maritime context. *Seas of Transition: Setting a Course for the Future*, 19.
- [32]. Roth, A. D. (2018). Leadership Strategies for Retaining Mariners Aboard State Maritime Academy Training Ships (Doctoral dissertation, Walden University).
- [33]. Goldberg, M., 2016. Mentoring in the Maritime Industry: The Value of Mentoring in the Maritime Industry. [Viewed 31 March 2023]. Available from: <https://www.marinelife.com/mentoring-maritime-industry/>
- [35]. Kram, K. E., & Isabella, L. A. (1985). Mentoring alternatives: The role of peer relationships in career development. *Academy of management Journal*, 28(1), 110-132.
- [36]. Nicolae, F., Rosen, I., Popa, C., Nistor, F., & Cotorcea, A. (2017). The relations between the port business framework and the qualified manpower competencies—Literature review and proposed guidelines. *Mircea cel Batran Naval Academy Scientific Bulletin*, 18(1), 83-88.
- [37]. Guo, F. B., Yang, Z., Davis, E. B., Khalique, A., & Bury, A. (2021). Does Being Human Cause Human Errors? Consideration of Human-Centred Design in Ship Deck Design. In *Advances in Neuroergonomics and Cognitive Engineering: Proceedings of the AHFE 2021 Virtual Conferences on Neuroergonomics and Cognitive Engineering, Industrial Cognitive Ergonomics and Engineering Psychology, and Cognitive Computing and Internet of Things*, July 25-29, 2021, USA (pp. 302-309). Springer International Publishing.
- [38]. Sogor, A. (2021). Lifelong learning: the 21st century skill to guide maritime training and development.
- [39]. Pekcan, C. (2017). Safety at Sea: Understanding the Role of the Psychological Contract in Seafarers' Safe and Unsafe Behaviour Using Affective Events and Ego Depletion Theories (Doctoral dissertation, Royal Holloway, University of London).
- [40]. Yuen, K. F., Bai, X., & Wang, X. (2020). Safety behaviour at sea: Policy implications for managing seafarers through positive psychology. *Marine Policy*, 121, 104163.
- [41]. Fan, S., Blanco-Davis, E., Fairclough, S., Zhang, J., Yan, X., Wang, J., & Yang, Z. (2023). Incorporation of seafarer psychological factors into maritime safety assessment. *Ocean & Coastal Management*, 237, 106515.

- [42]. Markopoulos, E., Lauronen, J., Luimula, M., Lehto, P., & Laukkanen, S. (2019, October). Maritime safety education with VR technology (MarSEVR). In 2019 10th IEEE International Conference on Cognitive Infocommunications (CogInfoCom) (pp. 283-288). IEEE.
- [43]. Teperi, A. M., Lappalainen, J., Puro, V., & Perttula, P. (2019). Assessing artefacts of maritime safety culture-current state and prerequisites for improvement. *WMU Journal of Maritime Affairs*, 18, 79-102.
- [44]. Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications.
- [45]. Fusch, P., Fusch, G. E., & Ness, L. R. (2018). Denzin's paradigm shift: Revisiting triangulation in qualitative research. *Journal of Sustainable Social Change*, 10(1), 2.
- [46]. Denzin, N. K. (2017). *The research act: A theoretical introduction to sociological methods*. Transaction publishers.
- [47]. Christodoulou, A., & Echebarria Fernández, J. (2021). Maritime Governance and International Maritime Organization instruments focused on sustainability in the light of United Nations' sustainable development goals. In *Sustainability in the Maritime Domain: Towards Ocean Governance and Beyond* (pp. 415-461). Cham: Springer International Publishing.
- [48]. Galieriková, A. (2019). The human factor and maritime safety. *Transportation research procedia*, 40, 1319-1326.

Questionnaire 1 The general elements that determine risk in maritime transport and the culture of maritime safety

Nr.	Question	Code
1	Gender ( <b>1</b> - Male; <b>2</b> - Female)	
2	Age: <b>1</b> - 22-25 years; <b>2</b> - 25-30 years; <b>3</b> – 30-35 years; <b>4</b> - 35-40 years; <b>5</b> - > 40 years.	
3	Specialization (1 = deck, 2 = engine; 3=electric; 4= other position)	
4	Profession / Actual workplace ( <b>1</b> – cadet; <b>2</b> – officer; <b>3</b> – other function; <b>4</b> – navy officer)	
5	For the position of officer: the number of years at sea ( <b>1</b> ; <b>2</b> ; .... <b>10</b> ; <b>&gt;10</b> )	
6	For cadets/ other ratings positions: number of contracts ( <b>1</b> ; <b>2</b> ; <b>3</b> ; <b>4</b> ; <b>5</b> ; <b>&gt;5</b> )	
7	Type of ship you sailed on (multiple figures can be written): <b>1</b> - cargo; <b>2</b> - tanker (oil, product, chemical); <b>3</b> - bulk carrier; <b>4</b> - container; <b>5</b> - passenger; <b>6</b> -Ro-Ro/ferrybot; <b>7</b> - offshore; <b>8</b> -others)	
8	Shipping company/ Navy: .....	
9	Marital status ( <b>1</b> - Married; <b>2</b> -Not married; <b>3</b> -Divorced)	
7	Socioeconomic status ( <b>1</b> = superior; <b>2</b> - medium to superior; <b>3</b> = medium to low; <b>4</b> = low)	
10	How much risk do you perceive you are exposed to while at sea?: <b>1</b> - unimportant; <b>2</b> - small; <b>3</b> – medium; <b>4</b> – big; <b>5</b> – very big.	
11	How do you perceive the safety climate you encountered during your travels: <b>1</b> - less safe; <b>2</b> - safe; <b>3</b> – very safe.	
12	What is the level of work accident risk assessed for the activity carried out on board the ship?: <b>1</b> - unimportant; <b>2</b> - small; <b>3</b> – medium; <b>4</b> – big; <b>5</b> – very big.	
13	What is the level of fire/explosion risk in the activity you carry out: <b>1</b> - unimportant; <b>2</b> - small; <b>3</b> – medium; <b>4</b> – big; <b>5</b> – very big.	
14	What is the level of risk of pollution (any form of pollution) in the activity you carry out: <b>1</b> - unimportant; <b>2</b> - small; <b>3</b> – medium; <b>4</b> – big; <b>5</b> – very big.	
15	What is the level of risk of terrorist attack/piracy in the activity you carry out: <b>1</b> - unimportant; <b>2</b> - small; <b>3</b> – medium; <b>4</b> – big; <b>5</b> – very big.	
16	How do you rate the time allowed for rest during the voyage: <b>1</b> - totally insufficient; <b>2</b> - insufficient; <b>3</b> – satisfactory; <b>4</b> – sufficient; <b>5</b> – more than sufficient.	
17	Taking into account the financial aspects (earnings) but also the state of fatigue recorded during the voyage, what do you think is the optimal duration for a contract: <b>1</b> - under 2 months; <b>2</b> - between 2 and 3 months; <b>3</b> – between 3 and 4 months; <b>4</b> – between 4 and 5 months; <b>5</b> – between 5 and 6 months.	
18	How many minor accidents have you had while at sea?: <b>0</b> - none; <b>1</b> - one accident; <b>2</b> - two.....; <b>5</b> – five; <b>6</b> – more than five.	
19	If today's date were to be considered as a reference, how many more years will you want to practice in this field: <b>1</b> - under 2 years; <b>2</b> - between 2 and 4 years; <b>3</b> – up to 5 years; <b>4</b> – between 5 and 10 years; <b>5</b> – over 10 years.	
20	If you were to stop going at sea (as a deck/mechanical/electrical officer) what would be the field in which you would prefer to continue your work:  (1 = port management, 2 = shipbuilding and repair; 3= education and training; 4 – Navy; 5 = other field, please write down) .....	