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TOPICS OF INTEREST

Change in Perception About Stress Causing Factors of Maritime Students on Becoming a Seafarer

Mihir Chandra, R S P Singh

This qualitative and longitudinal study focuses on the change of perception of erstwhile maritime students once they start sailing. In earlier research we found multiple factors causing stress to Indian maritime students. These factors can be broadly classified either as Personal Factor, Academic Factor, Family Factor and Fear Factor. After they started sailing, they find that now their families are satisfied that he/she was right in choosing this career and they now have more realistic expectations. They are surprisingly now feeling less homesick compared to when they were maritime students. They find it easier to adjust to the food available on the ships. But they miss the social intimacy even more when onboard. They now face language barrier on ships, may be because the staff on a ship come from different cultural, ethnic national backgrounds. The workload is much more than what they had anticipated as maritime students. They also find that the competition with colleagues is much more intense than what they faced with the classmates as maritime students, as also the pressure to perform. But they get enough resources on the ship to achieve their optimum performance. However, they are not sure whether their concern about job continuity as a seafarer is higher than the job prospect anxiety as a maritime student. As regards health factors, surprisingly they are satisfied with the quantity of sleep they get. Another surprise was that they feel less threatened by pandemic on ships as compared to campuses. Two obvious findings are the fear of sailing has gone and they now feel more financially secure. We conclude that the perceptions about stress causing factors change with after becoming a seafarer. However, most of them have expressed the opinion that a full-fledged course at the campus about the factors mentioned above would have prepared them better in facing the changes which they encounter now.

KEY WORDS

Change in perception, Indian, Seafarer, Stress causing factors, Full-fledged course, Better prepared.

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Application of Interpolation in Different Branches of Navigation and Cargo Handling

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Throughout history as well as today, the term navigation in itself comprises a whole set of skills needed for operating a vessel and safe handling of her cargo. Therefore, it could be argued that navigation consists of different branches – coastal, celestial and electronic. Cargo operations on the other hand embody cargo handling and ship stability. But all of the above-mentioned subjects share the same connection, which is that in their everyday use and different applications throughout the maritime profession they are based on different mathematical operations and methods. One such method used in data analysis is interpolation. The purpose of this paper is to explain and give a closer look at different methods for determining unknown values of a quantity using known values located within an interval defined by a discrete data set in which the laws of its changes are known. Interpolation is something that is in everyday use by deck officers on board vessels, and it is also one of the more complex methods with which the students of Croatian maritime schools and universities are acquainted with during their studies. By simply describing facts, processes and objects in in question or relation to the presented subject in question, as well as with its empirical confirmation and proof of relationships and connections, without much scientific interpretation and explanation the method of interpolation is shown at its theoretical and practical levels. The information sources that have been used are compiled trough reviewed scientific research work, with sufficient mathematical methods that describe the laws of the interpolating method. The paper shows that there are different methods in use, the use itself is essential in everyday work, and that the method in use determines the effectiveness and the accuracy of needed calculations. So, it is of vital importance that a level of significance and attention is put on appropriately mastering and using this method for the purpose of educating and creating competent future deck officers, as well as the emphasis for cross curricular cooperation.

KEY WORDS

Interpolation, Navigation, Mathematics, Function, Data set.

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Career Development for Seafaring Officers to Meet the Requirements of the Maritime Industry

Ergun Demirel

People's career planning in light of society's requirements is highly important to realize the sustainable development and well-being of our civilization. To meet the existing and future requirements of society new professions are appearing and some professions are evolving and reshaping under the pressure of rapidly changing technology. The change in the business and industry also affects the education system including the organization of education institutes, course programs, and delivery methods.

The seafaring officer profession is an important element of the maritime industry which is an indispensable component of the world economy. Ships, ports, and shipyards are developing exponentially by getting benefits from sophisticated technology. The seafaring officers have significant competencies not only working on board but also assuming many roles and responsibilities at all maritime-related organizations such as ports, shipyards, and different types of transportation and logistics facilities.

This study aims to investigate seafaring officers' career development opportunities to meet the maritime industry's existing and future manpower requirements and introduce new job opportunities for seafaring officers.

KEY WORDS

Seafaring officers, Career development, Maritime industry, New job opportunities, Maritime manpower

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Standardization in Maritime Education and Training - Case Study of the Faculty of Maritime Studies Kotor

Vera Kapetanović[1], Maja Krčum[2], Igor Petrović[1], Igor Stanovčić[1], Tatijana Dlabač[1]

Standardization of seafarers' competencies is regulated by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). This Convention defines minimum quality standards in the education and training of seafarers. Therefore, it is crucial to understand the concept of standardization and distinguish the terms competence, knowledge and skill. The level of competence depends on the quality of education and training of seafarers, which are carried out at the corresponding institutions.

Maritime Education and Training (MET) institutions worldwide aim to create a high quality seafarer with adequate competencies. The quality of these institutions' work is the responsibility of a their countries. In order to create a competent seafarer, MET institutions should follow the development of new technologies, and innovate their curricula accordance with STCW and other relevant Conventions. It is also necessary to develop a model that assesses the actual competence of candidates who received their education and/or training at the aforementioned institutions.

This paper will present research on the importance of standardization in the education and training of seafarers at the Faculty of Maritime Studies Kotor. The aim of the work is to determine to what extent a student or a seafarer recognizes the importance of standardization within the educational process as well as the application of acquired knowledge on board. For this purpose, a survey will be conducted among a representative number of students and seafarers.

KEY WORDS

Standardization, Maritime Education and Training (MET), Seafarers, Educational process

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Genre Features of a Seaman Resume

Kristina Radnjić, Milena Dževerdanović-Pejović

A seaman resume, as a genre, has become a novelty in recent scientific studies. Most of these studies are focused on analyzing the content of this formal document. However, there are certain aspects in which a seaman's resume differs from others. In particular, although the layout of the resume has been standardized in the maritime industry, there have been many differences in the structure and quality of language. With this in mind, the aim of this paper is to point out which features are commonly used in a seaman resume. To achieve that, the authors have used a corpus-based analysis of 25 seaman resumes in the English language. Relying on the genre analysis approach, we first discern the specific structure of a resume and then proceed with the analysis of peculiar syntactic and semantic levels. Finally, we propose a sample model of a high-quality seaman's resume that will draw the attention of future employers, in particular the manning agents. The research findings of this paper have educational implications as they can be used as guidelines for creating a well-structured seaman resume.

KEY WORDS

Seaman's resume, Genre analysis, Maritime education.

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Enhancing Students' Engagement in Learning Mathematics Using GeoGebra in Maritime Education

Anita Gudelj

This study presents the effectiveness of resources developed by mathematics teachers during the MareMathics project. The focus is on the effects of the dynamic mathematics software GeoGebra on student achievement in learning mathematics at maritime higher education institutions from Croatia, Latvia, Poland and Estonia. Geogebra is an open-source computer program to support teaching and learning mathematics contents, especially in algebra, geometry and statistics. During this project, various Geogebra models were developed, which are expected to greatly assist students in visualizing abstract mathematical content and maritime applications quickly, accurately and efficiently. The research was conducted on 45 students who participated in the MareMathics Summer School. Data were obtained from students' pre-test and post-test. The analysis of the collected data determined the students' satisfaction with the presented contents and that GeoGebra is an effective tool for enhancing students learning and understanding of mathematical contents and their application in solving different maritime issues. GeoGebra software can effectively encourage teachers at maritime higher educational institutions to employ information technology as a supporting tool to improve students' attitudes towards mathematics learning. Learning models with Geogebra give students more chances to explore their minds and more ideas on how to connect mathematical knowledge with solving various issues in maritime affairs.

KEY WORDS

Higher maritime education, Mathematics, Visualization and simulation, GeoGebra, Student's attitude.

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Investigating Actual Use of SMCPs in VHF Communications: Assessment and Implications for MET

Matthew Rooks

Clear, comprehensible VHF communications are a vital part of ensuring safe navigation for vessels. The use of Standard Marine Communication Phrases (SMCPs), including Message Markers (MM) during radio communications are some of the methods IMO implemented in 2001 to ensure communications are conducted in a unified language that reduces the risk of miscommunications and subsequent dangerous situations. Through the implementation of surveys, this research investigates the actual use of such SMPCs by port radio operators in Japan as well as various techniques used by these professionals to deal with miscommunication and/or difficulties with VHF communications. Results indicate disparate usage of SMCPs and MMs in both seafarers and port operators, and some clear indicators of methods used to overcome instances of miscommunication. Both problematic areas connected to the utilization of SMCPs in VHF communication as well as effective techniques for dealing with miscommunication identified through this investigation offer insight into how to improve future MET to ensure increased compliance with SMCP usage rates in VHF communications between port radio operators and seafarers.

KEY WORDS

Maritime English, VHF Communication, SMCP, MET, VTS.

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Training of Employees in a Maritime Company Brodospas

Marina Brodarić Ivačić[1], Luka Vukić[2], Mira Pavlinović[2], Ivan Peronja[2]

Training is a tool of management to ensure and develop high-quality employees. Those who have developed, initiated, and continuously invested in the training and education process have an advantage in the human resources field, ensuring quality employees who can perform work according to predetermined standards. Daily changes in the external and internal business environment encourage companies to invest as much as possible in the training and education of employees as one of the most effective ways of achieving a competitive advantage. The main goal of this paper is to study the approach of methods, training, and education programs of Brodospas p.l.c. as well as how the company manages human resources. The paper investigates the types of training organized in the company, including the administration and seafarers, who is responsible and who conducts it, on what basis, how are decided to conduct training, and evaluated their results. The meaning of the concept and characteristics of the training process, the assumptions of successful training, and the need for personnel training are explained. Every year Brodospas p.l.c., invests in the training of its employees and organizes special programs, recognizing the strategic importance of training.

KEY WORDS

Employees, Training, Maritime company, Management

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Prejudice Against Seafarers' Wives

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Prejudices are unfounded judgments and ideas about someone or something, and the connotations lean more toward the negative. The maritime industry represents a set of activities, skills, and social relations at sea or related to the sea. Thus, it is clear that there are several aspects of employment in the maritime industry: at sea and on land. This paper investigates and shows the potential existence of prejudices against the wives (partners) of seafarers who are aboard in the academic community intending to see if any exist and what are the differences in opinions between teaching and non-teaching academic staff. Since very little research has generally been conducted on the partners of seafarers as a demographic group, this paper tries to encourage further research on this topic. For that, a survey was conducted on 124 employees of the University of Split, of which 30 were teaching staff and 94 were non-teaching staff, and the results showed that 36.67% of the teaching staff believe that there are still prejudices against seafarers' wives, and of that number, 27.27% think or were undecided that the happiest women are those married to seafarers, and 18.18% believe or have remained undecided how there is no unity in the seafarer's family. On the other hand, of the 46.07% of non-teaching staff who believe that there are prejudices against seafarers' wives, 34.15% believe or are undecided that the happiest women are those married to a seafarer, and 12.20% believe that there is no unity in a seafarer's family with a large number of those who could not decide (43.90%). The results of the research showed that there are still significant prejudices against seafarers' wives. Separation from her husband and constant change of routine along with the existence of prejudice about the ease of life of a seafarer's wife further complicates the daily life of a seafarer's wife and can contribute to additional unrealistic expectations and evaluations in the relationship between the seafarer-husband and the seafarer's wife.

KEYWORDS

Prejudice, Seafarers, Seafarer's wives, Maritime industry.

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Application of Satellite-Derived Bathymetry in Hydrographic Activity of the Republic of Croatia

Nenad Leder[1], Tea Duplančić Leder[2]

Hydrography is the branch of applied sciences that deals with the measurement and description of the physical features of oceans, seas, and coastal areas. Sea depth measurements were primarily carried out for the purposes of navigation safety, especially in shallow coastal areas. Historically, bathymetry was mapped based on ship soundings when different types of depth sounders were used. The International Hydrographic Organization (IHO) has "tightened" the minimum standards of horizontal and vertical accuracy of the bathymetric survey in different orders of the survey over time. In the Republic of Croatia, the Hydrographic Institute of the Republic of Croatia carries out a hydrographic survey including a survey of the sea depths, without legal obligation to apply the satellite-derived bathymetry (SDB) method which is significantly cheaper than the expensive acoustic method of measuring sea depths. The main aim of the paper is to obtain information about the possibilities of the SDB method to meet the demanding standard of bathymetric measurement in the coastal mapping area of the Republic of Croatia, up to 20 m deep, i.e. up to depth areas where the largest number of ports and access waterways are located. The purpose of the article is to increase the safety of navigation of ships in the coastal area of the Republic of Croatia. Three SDB methods for determining sea depth are presented: optical, SAR sensors, and altimeter bathymetry. The basic technical characteristics of the satellite missions used in the paper and the spatial resolution and accuracy of the satellite images are described. Furthermore, the results of all published scientific papers that used all three SDB methods for the marine area under the jurisdiction of the Republic of Croatia are presented. The results of the research show that an extremely small number of scientific papers have been published that use SDB methods applied in Croatian territorial waters. It is concluded that all SDB methods presented in this paper do not satisfy the International Hydrographic Organization (IHO) Standards for Hydrographic Surveys S-44 (2020). This means that the results of SDB depth determination methods presented for the Croatian part of the Adriatic Sea have, until now, only scientific value and cannot be used for the publication of official nautical charts.

KEY WORDS

Hydrographic surveying, Satellite imagery, Coastal mapping, Croatia.

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Decision Support System Software Development for the Maritime Transport Infrastructure Optimization

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Improving the efficiency of transport systems is of great importance for many companies and regions. Therefore, there is a need to develop innovative methods of planning and management which are capable to significantly improve the performance of complex transport systems by increasing the coordination of cargo flows and optimizing the use of available resources. Aim: The aim of this work is to analyze some issues related to the creation of decision support systems for the optimization of the complex maritime transport infrastructure. We consider a project for the decision support system software development to substantiate long-term modernization strategies for the Emden Ro-Ro terminal. When evaluating the operation of the Emden Ro-Ro terminal, it was necessary to take into account the cargo flow trends, specific navigation conditions, the organization of stevedoring operations and a number of other factors. The main tasks facing this study primarily concerned the evaluation and justification of the strategic plans for the long-term development of the terminal. However, the solution of these problems turned out to be impossible without taking into account and analyzing the specifics of a number of processes that should be managed at the operational level. Methods: Since the classical analytical methods of queuing theory and optimal control methods did not allow us to study the problems in full, the decision support system software was developed based on the discreet-event simulation approach. Results: The proposed decision support system software made it possible to evaluate admissible cargo flow level for the terminal, indicate bottlenecks, substantiate appropriate options for infrastructure modernization in different scenarios of cargo flow changing and perform risk assessment. Conclusion: One of the most difficult problems in creating decision support systems for modern maritime transport systems is modeling the operation of dispatch services. Typically, the modeling of dispatch services requires the development of complex algorithms and a specific approach for each individual situation. Despite the complexity of designing and creating simulation models, this approach shows high efficiency.

KEY WORDS

Maritime transportation, Decision support system software, Optimization of transport infrastructure, Ro-Ro terminal.

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Yachting Industry in Montenegro: A Panel Discussion on Management, Marketing and Sustainable Development

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A strategy of nautical tourism in developing countries such as Montenegro is necessary for establishing economic, institutional, socially responsible, and legal frameworks for developing this significant economic activity. The paper aims to analyze the current level of development of the yachting industry and its prospects in Montenegro from the representatives of the three dominant relevant structures: the government, the economy, and the university. During 2 and a half hours of active communication, the panel discussion gave a synergistic response to a set of ten questions proposed by the moderator. The results of the paper are presented as conclusions of a panel discussion on the three aspects of the development of yachting in Montenegro: management, marketing, and sustainability. Management aspects are presented by advantages, disadvantages, opportunities, threats, development strategy, human resources, stakeholders' cooperation, and future development of the yachting industry in Montenegro. Marketing aspects in the paper are explained by combining traditional and digital marketing instruments and concepts. Sustainable aspects presented the natural environment and cultural heritage in Montenegro in the context of yachting development. All participants in the panel discussion recognized the importance of nautical tourism development and confirmed that yachting in Montenegro has an increasing trend and upward trajectory. In the future, greater importance must be attached to the systemic management of this branch of the economy, sustainable preservation of existing natural and cultural resources, and a modern approach to destination marketing.

KEY WORDS

Yachting industry, Management, Marketing, Sustainable development, Montenegro, Panel discussion.

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Management of Business Processes in a Maritime Company

Marina Brodarić Ivačić[1], Maja Krčum[2], Anita Gudelj[2]

In today's world economy, which under the influence of globalization expands markets, but also brings competition closer, many companies are looking for ways to increase efficiency and reduce business costs. As a sequence of events, the acceptance of the process approach, as a key element of business, appears. Process orientation helps companies think through how their activities and tasks add or subtract value for consumers and adds a new dimension of complexity to organizational structures. The importance of process orientation best reflects the conclusion of the Gartner consultancy: "Business process management wins the triple crown: for saving time, for saving money and for adding value". She also expands the business and emphasizes the importance of technology in designing a strategy that provides a competitive advantage. Finally, process management brings both short-term return on investments and long-term value on invested capital to the company. For all processes, jobs, and tasks in the shipping organization to be performed effectively and efficiently, and in order to see the complete picture of the organization and its environment, shipping organizations need to develop information systems and software products for processing transactions and resort to the synthesized combination and aggregation of data from of many separate, but unconnected, or inappropriately connected, systems. This work will show how the company Brodospas performs and organizes ship processes.

KEY WORDS

Business processes, Ship processes, Decision management, Information systems.

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The Importance of Digitalization for Sustainable Development of Maritime Industry

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Maritime transport is the driving force of global trade and is one of the fundamental activities of the blue economy. In the face of changes in globalization, it must face technological change. According to the United Nations Conference on Trade and Development, the global commercial shipping fleet grew by 3 percent, in 2020 to 99,800 vessels of 100 gross tons or more. One of the key drivers of technological change in the maritime industry is digitalization. The digitalization of shipping is a step toward making it more environmentally friendly and efficient. This will lead to significant cost savings and improve vessel efficiency, transparency and market access. For the future development of the maritime industry, digitalization combined with environmental sustainability is essential. Experts agree that the COVID -19 pandemic has created certain challenges but also opportunities by creating a great imbalance in the industry and accelerating the progress of digitalization and innovation. The fourth industrial revolution is expected to have a significant impact on maritime transport. The IMO Convention on Facilitation of International Maritime Traffic and the WTO Agreement on Facilitation of International Maritime Traffic have created common standards and regulations that have paved the way for digitalization. Despite the technological advancements in the maritime industry, there is still much room for further research in developing countries. Digitalization in the maritime sector should be promoted as part of global efforts to increase supply chain resilience. It is the pathway to greener and smarter shipping, and this paper aims to provide an insight into the digitalization of shipping and highlight its importance for the future, as well as demonstrate that it contributes to achieving the sustainable development goals. The level of digitalization in seaports and maritime transport will also be analyzed. The adoption of digitalization in the maritime industry is essential and will lead to greener maritime transport, a robust economy and increased safety. The paper includes primary research on the example of shipowners in the coastal liner passenger transport of the Republic of Croatia, and a questionnaire consisting of 19 questions was used to conduct the research.

KEY WORDS

Sustainable development, Digitalization, Maritime industry, Technological changes.

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Computer Vision for Autonomous Vehicles

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The aim of the study is to show how students can participate in experiments that are related to cutting-edge technologies. Edge detection method was explored in order to detect lines at road. Hence, the possible application is in the lane keeping in road transport or in autonomous vehicles. The work includes recording of real situations, which are analyzed later, but at real-time speed. The results section presents operation at real situations when there are no problems and when there are problems, which are discussed. Autonomous vehicles, AI, and machine learning are present in ever day life. In this paper, initial stage is presented for a part of autonomous vehicles – computer vision in lane detection. Further research should include situation awareness at real-world scenes. Used algorithm does not provide sufficient results in curved roads, but with additional experiments and development, it has a potential of improvements. Efficiency of the algorithm is a product of many factors, which should be considered during programming. Detection problems are caused by too much illumination, sudden change of the illumination (i.e. entrance/exit from the tunnel), running to the shadowed part of the road (binary margin filter does not operate with the same quality), etc. Adaptive thresholding could solve some of the problems. In such case, illumination should be measured, which should be an input to the definition of filter margins.

KEY WORDS

Lane keeping assistance, Computer vision, Traffic, Autonomous vehicles.

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Application of Capacitor Banks in the Ship's Power System

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The electrical system is a crucial component of any ship's operation, responsible for the production, transmission, distribution and consumption of electrical energy. One of the biggest challenges faced by the ship's electrical network is the provision of reactive energy to the asynchronous motors that are its largest consumers. This paper focuses on the use of capacitor banks as a possible solution for this problem.

Power Quality (PQ) assessment is carried out during the design and exploitation phase of the ship. PQ assessment is done by modeling the system, which includes the design and selection of ship generators, levels of voltages, adding filters, adding capacitors, determining the characteristics of consumers connected to the ship's network, and measuring the quality of electricity during a sea trial.

The primary objective of the ship's electrical system is to ensure an uninterrupted power supply to vital consumers. It is therefore essential to supervise the distribution system and maintain a stable source of voltage level to prevent electrical consumer failure. The use of static capacitors is one possible solution to control the supply voltage level, reduce power and energy losses in the ship's network, and regulate reactive power. In this paper, we did research and presented one example of the implementation of capacitor banks in the passenger ship's electrical network in order to reduce the amount of reactive power in the distribution grid.

This paper aims to provide insight into the role, importance, and optimal location of capacitor banks in the ship's power system. By understanding the benefits and challenges associated with the implementation of capacitor banks, ship operators can make decisions about the design and operation of their electrical systems. Ultimately, this can lead to improved power quality and more efficient operation of the ship's electrical network.

KEY WORDS

Capacitor banks, Power quality, Reactive power, Ship's distribution network

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Combat System on the Croatian Navy Fast Attack Craft "Kralj Petar Krešimir IV"

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The European security and defense policy enables the use of EU members' military and civilian assets for various operational tasks in accordance with the international law. Depending on the nature, scale and the overall impact of a crisis, some situations may require the use of military force. Unlike merchant ships, naval warships have weapons and associated combat systems in order to carry our various combat tasks. Combat systems are the foundation of naval warships and determine their combat power. Combat systems can vary in elements and the level of integration, depending on combat tasks. Numerous global defense industry companies have been developing their combat systems in accordance with new technologies, warfare doctrine and different types of threats. One of the world's leading companies in the defense industry is the Swedish SAAB, which has been developing the 9LV combat system, integrated on different warships around the world.The system provides complete Command, Control, Communications, Computers and Intelligence (C4I) support for all types of naval warships (from patrol ships, frigates and even larger ships and/or submarines), enabling the commanding staff with exceptional operational capabilities. The 9LV fire control system is integrated on several fast attack crafts of the Croatian Navy, and the first Croatian Navy fast attack craft with this type of fire control system is the RTOP-11 "Kralj Petar Krešimir IV"

KEY WORDS

Security, Defense, Warships, Combat system, 9LV fire control system.

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Developing Cyber Resilience in Naval Domain

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Cyberspace has become a critical component of national security. This is confirmed by the fact that it has been defined as the fifth dimension of warfare. Contemporary military doctrines recognize the terminological shift from the concept of the "battlefield" to "battlespace". The increased digitization of the Navy opens numerous opportunities. At the same time this threatens the security of its assets – the data, systems, and people. Previously the information and communication systems were isolated but with the emergence of the Internet they became increasingly interconnected and thus more vulnerable. As the importance of effective communication between different naval segments increases, it is necessary to adequately protect them. The paper provides an overview of the trends that have led to the increased importance of cyber security in the Naval Domain. Next, the position and role of cyber capabilities as well as the importance of their further development are pointed out. Authors note typical attack vectors over which systems can be compromised followed by categorization of cyber threats. Furthermore, an overview of recent naval cyber incidents is presented. The importance of protecting all components of cyber security is emphasized in order to develop a more resilient environment and reduce the consequences of potential attacks, stressing the importance of the human factor. As the digital age has also influenced modern warfare, the paper elaborates issues of national strategies and military doctrines with special reference to the protection of the national cyber space in the Republic of Croatia. Finally, authors provide their expectations about the development of the studied area with recommendations for improving the current state of affairs.

KEY WORDS

Cyberspace, Cyber security, ICT infrastructure, National security, Naval fomain, Attack vectors, Resilience

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Optimization of the Application of Autonomous Underwater Vehicles in Underwater Protection

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The underwater environment is an under-researched area, and in recent years there has been a great interest in its research. Robotization, or the use of underwater vehicles, achieves significant effects related to the research of the underwater environment, which avoids exposing people to risk, for example, for mine countermeasures. The correct choice of technological solutions is of crucial importance for future efficient and economically justified application. One of the basic problems related to the protection of the undersea is the lack of interest in society for a more serious consideration of what and how to do with the undersea. Maritime countries must have control over the processes that take place under their seas.

KEY WORDS

Underwater vehicle, Undersea protection, Crisis, Military, Threat

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Prioritizing Shipyard Conversion Requirements Regarding Green Ship and Green Shipyard Concept

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The zero waste, zero emission targets set by the International Maritime Organization (IMO) regarding ship emissions until 2070 brought the realization of the green ship and green shipyard concept to the fore. Shipyards around the world are predominantly second and third generation. The fourth and fifth-generation shipyards do not fully meet the 2070 criteria. Therefore, it is necessary to build green shipyards or transform existing shipyards to produce green ships. The study aims to determine the shipyards' conversion requirements and prioritize these needs so that a 32.000 DWT Dry Bulk Carrier can be built and classified as a green ship. Qualitative research methods were used in the study, and the criteria determined in this context are analyzed with the Analytical Hierarchy Process (AHP). At the end of the study, the proposals regarding the transformation strategies of green shipyards have been developed.

KEY WORDS

Green ship, Green shipyard, Maritime shipping, Maritime transportation management engineering, Maritime technologies, Maritime economy.

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The Analyses of the Failures of Hull Structure Plating Caused by Corrosion

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There are a lot of different factors of hull structure degradation such as cracks, damage, fatigue or corrosion. Fatigue and corrosion were the most thoroughly examined in the previous studies. Corrosion is a more dominant form of degradation that causes the reduction of the original thickness of materials over time, which can be expressed through weight loss, in millimeter or percentage of thickness diminution of steel plates. Corrosion process can reduce carrying capacity and longitudinal strength of vessels, cause different types of failures or lead to the pollution of surrounding areas. This study analyzes the corrosion of a structural element of a fuel tank on the old bulk carrier that has been in operation for 25 years. The database consists of thickness measures expressed as percentage of diminution of the original plate thickness and the analysis of the chemical composition of a corroded and replaced steel plate. The study examined the total of 350 measured data after 5, 10, 15, 20 and 25 years of ship exploitation. Similarly, the research observed the chemical composition of the replaced steel plate. Linear corrosion models were developed while the chemical composition was analyzed by means of Energy Dispersive X-ray analysis of the samples from both sides of the corroded plate. The obtained results indicated that the degree of corrosion significantly varies depending on the environment of the plate. Furthermore, the formed linear corrosion model adequately follows the empirical data and value of 1,55 %/year.

KEY WORDS

Corrosion, Failure, Linear model, Fuel tank, Bulk carrier.

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Principles of Torque Measurement in the PFST Instrumented Sliding Bearings Test Rig

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The sliding bearings instrumented test rig has recently started its service in the TEMPO Lab of the Faculty of Maritime Studies of the University of Split and is an essential part of the laboratory and the research itself. The main objective of the tests is to validate their energy efficiency with respect to the frictional power losses. In the context of the numerous possibilities for testing bearings, this paper will present a method that has been developed and applied in the test rig to measure the frictional torque originating from the lubricant. The method comprises the explanation of the concept for the application of hydrostatic bearings to eliminate dry friction torque between the bearing housing and its seating in the two main configuration settings: intermediate shaft bearings and aft stern tube bearings, the measurement principles, as well as the input data and output values relevant in these measurements. The results contain the presentation of the torque and power losses values obtained by the actual measurements for the aft stern tube water lubricated polyether PU bearing of 300 mm in diameter with its 2:1 ratio within the range of shaft journal rotational speeds and vertical loading values. The application of hydrostatic bearings in the test rig for hydrodynamic sliding bearings provides a reliable background to determine the actual torque loading of the shaft journal in the test bearing of the rig and consequentially its power loss function due to friction, thus directly influencing the energy efficiency of the tested bearing in the tested configuration.

KEY WORDS

Marine propulsion system, Intermediate shaft and stern tube bearings, Hydrodynamic lubrication, Hydrostatic bearings, Frictional torque and power loss, Validation measurements.

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Fuel Exergy Based on the Chemical Equilibrium of Combustion Gases

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The evaluation of the energy efficiency of ships is becoming increasingly important, not only because of the reduction of the operating costs of ships, but also because of the regulations on exhaust emissions from ships. Energy analysis does not consider the quality of the available energy, but only the energy conversion, regardless of the possibility that the process takes place. Exergy efficiency, which considers the quality (availability) of energy achieved by burning fuel, is increasingly used, but unfortunately not in commercial applications. In this paper, the standard chemical exergy and exergy efficiency of the methane combustion process are analyzed in terms of the combustion products formed at complete combustion and the combustion products formed at chemical equilibrium. The calculation of the lower and higher heating values of the fuel and the chemical energy of the gaseous methane is based on the complete combustion of the fuel, considering nitrogen as an internal gas and the water in the combustion gases leaving the system either as a liquid or as a vapor.

KEY WORDS

Fuel exergy, Exergy efficiency, Combustion, Chemical equilibrium composition.

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Predictive Diagnostics Applied to Naval Equipment

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Due to the high competitiveness between shipping lines in achieving the required levels of operability, it is necessary to apply an appropriate maintenance strategy to the ship's propulsion and auxiliary equipment in order to achieve the highest availability and reliability at the lowest possible cost. The monitoring of equipment has taken on a dimension in which manufacturers have developed very powerful data acquisition systems, which has resulted in a growing computerisation of processes and monitoring, allowing a large number of variables to be recorded in real time with frequencies of up to milliseconds. However, the large number of monitored variables makes it difficult to visualise the evolution of the process quickly and effectively. In addition, current systems generate an alarm when a failure has occurred, leading to erroneous actions by the user, poor maintenance planning and generating unscheduled stops. In view of this problem, the objectives of the present work were: (1) To present a novel tool for maintenance monitoring; (2) To optimise and facilitate predictive maintenance of the vessel; (3) To reduce the costs produced by unscheduled shutdowns. This paper presents a predictive maintenance methodology based on a statistical algorithm, which provides ship managers with appropriate information well in advance to make a correct decision before a real failure in the process. On a 284 m length ship, an auxiliary installation was selected and monitored using statistical control techniques. Data acquisition was carried out by means of the ship's integrated IAS (Integrated Automation System). The results showed that the developed algorithm can detect very early deviations of the process from its optimal operating condition and thus help in the selection and timing of maintenance, reducing peration and maintenance costs due to unplanned downtime. Therefore, it can be concluded that the tool for maintenance monitoring optimized and facilitated the maintenance of the vessel and reduced the costs caused by unscheduled downtime.

KEY WORDS

Maintenance, Predictive, Monitoring, Naval

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Energy Efficiency Analysis of Variable Frequency Driven Centrifugal Pump in Merchant Vessel Cooling System

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The seawater cooling system of diesel-powered merchant vessel is traditionally designed with centrifugal pumps driven by constant-speed electric motors. This arrangement provides constant pressure and flow in the system, regardless of sea water temperature and engine operating conditions. Whenever the vessel is underway in temperate to colder climates, during slow steaming, manoeuvring operations, or port and anchor stay, this flow exceeds demand, so the temperature in the fresh water system is maintained by a 3-way valve bypassing the central cooler. From the thermodynamic point of view, required flow reduction could be achieved on the sea water side instead, by reducing the pump speed. Considering that the shaft power of a centrifugal pump generally changes in a cubic relationship to its speed (a relatively small reduction in pump speed results in a significant reduction in the power required to operate the pump) and considering that there may be as many as three cooling sea water pumps per vessel running 24/7, it is clear that there is potential for energy savings. Speed reduction can be achieved by a variable frequency drive, which changes the speed of the electric motor driving the pump by changing its frequency. Previous works on this subject have assumed that the efficiency of the pump is either constant when the speed of the electric motor is reduced or have used somewhat arbitrary expressions to calculate it. While the assumption of constant efficiency is generally true when affinity laws are considered, it cannot be taken as fact without considering the pump as part of the system. The purpose of this paper is to analyse case study of ship's cooling seawater system and to determine whether the efficiency of the pump changes when its speed is reduced, and if so, to quantify that change. Analysis results will be obtained using Matlab software simulation.

KEY WORDS

Cooling sea water system, Centrifugal pump, Variable frequency drive, Energy efficiency.

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Comparative Analysis and Trends of Environmental Incidents in the Gulf of Mexico Offshore Oil Fields

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Marine oil pollution is a severe threat to the ocean environment. The Gulf of Mexico, with reserves of 26.77 billion barrels of oil and 197 trillion cubic feet of gas from 1325 oil fields, has an enormous potential impact on the world's energy supply and marine ecological balance. It has been the scene of marine pollution from the different offshore activities in the area. Offshore oil fields are maritime areas where hydrocarbon exploration, drilling and production are undertaken at or under the sea in association with oil or natural gas under the seabed. This paper presents an analysis and trends of environmental incidents in the Gulf of Mexico from 1964 to 2012, focusing on various data significant in the offshore oil industry. The objective is to analyse spill incidents by cause and the number of barrels spilt for the observed period concerning the number of structures. Results will show downtrends in environmental incidents and spilt barrels despite significant enhancement in the numbers of offshore structures and increased productivity.

KEY WORDS

Offshore, Environmental, Incident, Oil spill.

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Using Drones to Monitor Illegal Dumping Sites: A Contribution to Marine Engineers Education

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Illegal dumping continues to be a major problem worldwide, as it is well known that garbage, waste and recyclable materials lead to soil and water pollution, endangering flora, fauna and human health. Much of the trash and waste ends up in the seas and oceans, creating a vicious cycle that continues to worsen. Ultimately, it is a matter of educating society and changing its behavior, which may take several generations. The aim of this article is to communicate the practical experience shared with fifth year students of the Faculty of Marine Engineering in Split on the use of drones, monitoring of illegal waste sites, selection of recyclable finds and characterization of materials. To carry out the study, action research, case studies, and unstructured interviews were used as qualitative research methods in conjunction with on-site and photography, as well as drone photography from 50 to 10 m altitudes. The results showed that the students were satisfied with the experience, as they could see the quality of the image captured by the drone in action, see an illegal dumping area with their own eyes, became aware of a real unacceptable situation, and discuss possible solutions to recycling polymers, metals, electronic devices (WEEE waste), ceramics, glass, textiles and wood. The use of drone on surveilling illegal dumps, as well as identifying the type of materials is proven to be simple, reliable and fast.

KEY WORDS

Illegal dumping, Drone monitoring, Recycling of materials, Education.

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Geomorphological Factors to be Considered in the Case of an Oil Spill in Northern Adriatic

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If a major oil spill occurs in the Northern Adriatic, it is likely that part of the region's coastline will be affected. Different geomorphological types of coastline react to oil and are affected by it in different ways. At the international level, this is represented and parameterised in the form of NOAA's Environmental Sensitivity Indices (ESI). However, not every coastal type defined by the ESI can be found everywhere. So far, no sensitivity mapping has been carried out in the northern Adriatic. Therefore, three countries that share the territory, namely Croatia, Italy, and Slovenia, decided to study the coasts of the region and assign ESI values to them as part of the North Adriatic Incident Response System project (NAMIRS). The research teams approached this problem in two ways. The first was to reassess the ESI in a scientific way by identifying geomorphological coastal types using the EMODnet Geology Portal and assigning them a corresponding ESI value. The other method of assessing coastal vulnerability was done to obtain subjective opinions of professional stakeholders involved in either environmental protection activities or other oil spill response-related tasks. For this purpose, workshops were organised in each of the three countries. The values that determine the level of coastal clean-up difficulty, obtained in both ways, were then compared, and inserted into an electronic map available to first team responders who can prioritise coastal protection in the case of an oil spill using oil spill response assets and equipment such as oil booms, etc. However, the applicability of ESI indices proved to be difficult due to the different types of coasts around the world, insufficient data in EMODnet Geology database, and overestimation of vulnerability gathered in workshops. Consequentially, specific measures needed to be taken.

KEY WORDS

Geomorphology, Vulnerability, ESI, NAMIRS, Survey, Northern Adriatic.

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Mixed Reality and Autonomous Technology in Port Environmental Monitoring Based on PASSport Project

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It is becoming more crucial to offer a solution for managing the current mission and status of autonomous and semi-autonomous vehicles operating on site in big and complicated port areas. Digital twin systems, which offer a complete 3D reconstruction of the port with real-time data on all objects and operations going place, are being used by more ports. It is difficult to present all the data that is available in a way that will improve situational awareness and decision-making, leading to better management and a faster, more effective response during an emergency. This is because port areas are larger and drones operate in the air, on the water's surface, and underwater. A novel solution based on Mixed Reality (MR) technology is being developed by the PASSport initiative, a project funded by the European Agency for the Space Programme (EUSPA), to address this problem. The solution integrates real-time geo-tagged and Earth Observation data and will give end users access to an advanced 3D visualization of the port area through a dedicated Head Mounted Display (HMD) that tracks user location and movement.

KEY WORDS

Autonomous systems in ports, Pollution monitoring in ports, Quality of air in ports, Mixed reality.

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Advanced UAVs Applications in Maritime Search and Rescue and Environment Protection Missions

Zdravko Paladin, Nexhat Kapidani, Žarko Lukšić

Applications of Unmanned Aerial Vehicles (UAVs), UxVs, and various autonomous assets have an essential role in extending Maritime Situational Awareness and contributing to the improved emergency, safety, and environmental response. Successful missions related to maritime search and rescue and environmental protection or prevention require full operational surveillance capacities with a continual flow of information between UAV assets and ground coordination centers. To deal with various situations at sea and maximize efficiency, an advanced approach for first-responding organizations would consider UAVs integrating data gathering features, the next generation of wireless communications, and seamless access to video and sensor data. Related to various environmental and emergency situation at sea, the UAVs need to be supported with integrated modems with satellite communication and 4G/5G cells in order to provide detailed real-time situational pictures and enable the timely decision-making process for maritime first responders. The basic infrastructure model of communication networks for the UAV environment to cover the First Responder's requirements and working area is also described. The UAV assistance capabilities to Mission Critical Communications indicate many benefits for maritime safety missions but there are also some operational limits as well. Also, in this paper, we are presenting some procedures and tools that supported UAV use cases defined within EU project RESPOND-A.

KEY WORDS

Maritime Situational Awareness, UAV, Maritime SAR, Environmental protection, Advanced communications

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Using a Bubble Barrier System to Tackle Marine Litter in the Port of Split

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Due to increased environmental awareness and the global increase in maritime traffic, the appropriate technical solutions to tackle marine litter are a high priority to protect the marine and coastal environment. It is especially significant in port cities where a port often located in a densely populated area affects the urban population environment. This study aims to analyze the possibility of improving waste removal from the sea basin at the northern cargo terminals of the Port of Split by introducing a bubble barrier system. Regarding the cargo terminals' physical conditions in the semi-enclosed port basin, an increasing waste accumulation in the rear part of the port is noted. Hydro-meteorological, oceanographic, microclimatic, and other environmental influences are primarily responsible for these effects. For this purpose, an overview of the site, operational, environmental, safety, and other conditions was provided, considering both the proposed waste disposal technology and technical features of the port. The potential use of hydrogen as a renewable energy source to operate the waste containment system would support sustainability. Hypothetically, the selected innovative technologies and interventions in the cargo terminal space would reduce the amount of waste on the sea surface. Technical and operational challenges of the bubble barrier system and its suitability at sea will play a principal role in the future decision-making process on potential installation at the seabed.

KEY WORDS

Marine litter, Bubble barrier, Port of Split, Environmental protection

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Preserving Natural Resources of the Croatian Adriatic Through Maritime Spatial Planning

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The aim is to evaluate the importance of developing and adopting the maritime spatial plan in a present situation characterized by competing uses of the marine environment and its resources. The authors applied qualitative research method based on direct observations, authors' previous experiences and research, official documents, literature surveys and current research reports on the subject. The drafting and adoption of a maritime spatial plan with its accompanying strategic environmental assessment requires the involvement of experts, scientists, economic sectors representatives, and the public. The principles for good practice maritime spatial planning aimed at achieving environmental targets are presented, whereby focus is placed on land-sea interactions. Global coverage of the marine area by maritime spatial plans is constantly increasing, but the Republic of Croatia is lagging behind, it having as yet not adopted the maritime spatial plan for its sea. Analysis is made of the pressures on the Adriatic Sea and its eastern coasts, pointing to significant aspects to be contemplated holistically in drafting the maritime spatial plan which should be a prerequisite preceding any planning of economic activities along the coast, on sea surface, its column, sea bottom, and subsoil. In conclusion, maritime spatial planning should be seen as a mean for supporting healthy, productive, and rich biological resources in the sea, which are themselves vital for true economic well-being and that of the coastal communities.

KEY WORDS

Maritime spatial planning, Preservation of natural resources, Marine environment, Public participation, Blue economy, Adriatic Sea.

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A Comparative Evaluation of Cleanup Methods for the Mucilage Outbreak in the Sea of Marmara

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Mucilage is a white slimy structure that results from the uncontrolled growth of marine microorganisms. The structure has accumulated in the Sea of Marmara, Türkiye, causing a severe environmental pollution problem. Today, the issue has spread throughout the entire sea, posing significant challenges for environmental conservation efforts. The large-scale spread of the mucilage in the Sea of Marmara started in mid-2021, and the government including municipalities immediately took drastic measures to address this serious problem threatening the marine ecosystem. The recent scientific studies and prevention efforts of public authorities to prevent the mucilage outbreak have resulted in several findings that provide more information about the appearance of mucilage in the Sea of Marmara. These initiatives have also shown that this environmental problem should not be taken lightly. Although the problem of mucilage has attracted public attention lately, it was first seen in the Marmara Sea well before mid-2021 and was reported in mid-2007. Research studies have been accelerated to analyze this environmental problem and suggestions have been made to public authorities to support prevention efforts. These efforts yielded rapid results and the surface of the Sea of Marmara became much cleaner than at the beginning of the mucilage outbreak. However, the mucilage has begun to sink towards the bottom of the sea. Today, as of 2023, it continues to pose a serious environmental problem, spreading widely on the seabed and threatening the marine ecosystem.

KEY WORDS

Marine mucilage, Marine pollution prevention, Marine microorganisms, Marine snow, Marine engineering, Dirty sea.

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Particularly Sensitive Sea Area and the Eastern Adriatic Sea

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This paper analyses IMO Resolution A.982(24) - Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas - (adopted 1 December 2005) and attempts to identify arguments for designating the Adriatic as a PSSA area, taking into account cruise industry trends, cruise ship routing practices, and the newly created high-risk areas in the Eastern Adriatic region. As PSSA areas require special protection through IMO measures due to their environmental, socio-economic or scientific importance, as they may be vulnerable to damage from marine and coastal activities, the paper identifies the characteristics of the Adriatic Sea that may be an important argument for the designation of the Adriatic Sea as a PSSA. The aim of this paper is to review cruise traffic trends in the Eastern Adriatic and to test the PSSA criteria for the Adriatic region in order to assess the need for designating the Adriatic as a PSSA. One of the objectives is to raise awareness of current navigation practices in the central and southern parts of the Eastern Adriatic, which result in high-risk zones and pose safety and environmental risks. However, the implementation of additional regulations in the region has become necessary due to the large expansion of cruise ship traffic in this diverse and environmentally vulnerable region that previously lacked dense maritime traffic.

KEY WORDS

Cruise industry, Sustainability, Navigational safety, Marine environment, PSSA, Eastern Adriatic sea.

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The Cyber Threat Landscape in the Maritime Sector

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The paper addresses current issues of cyber resilience in the maritime sector. The most significant malwares affecting the maritime sector and their impacts are presented. The focus is on the main APT (advanced persistent threat) groups and malicious actors involved in these types of attacks. Their signatures and methods of compromise are analyzed. The different attack surfaces they use are presented. The main motives of malicious actors to compromise different sites in the maritime industry are highlighted. Some of the issues that make the maritime industry vulnerable to cyber attacks are presented.

KEY WORDS

Cyber resilience, Malwares, Malicious actors, Compromise, Vulnerable.

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Open-source-based Approach to Delineate the Shoreline from Space: A Case Study in Failaka Island, the State of Kuwait

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Researchers need to delineate the shoreline for different applications with no access to costly resources such as topographic maps and high-resolution satellite images. With the increase of open source data, this study aims to present a methodology to use open source data in the best possible way to map the shoreline. Several methods have been tested using open source remote sensing data (Landsat and Aster), such as supervised classification, unsupervised classification, manual digitizing, and by applying some spectral indices, among others. The accuracy of the extracted shoreline data was verified using high-resolution open database images such as Google Earth Pro basemap. The results showed that the manually digitized shoreline through applying NDWI (green- near infrared/ green+ near infrared) is the most accurate, although it remains important to validate and modify it using high-resolution images of open databases. Open source data showed acceptable accuracy in mapping the shoreline.

KEY WORDS

Remote sensing (RS), Geographic Information system (GIS), Geography, Coastal geomorphology, Arabian Gulf.

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Using Machine Learning Techniques for Predicting Electrical Data of PV Panels from RGB Images

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The need for renewable energy sources in the maritime industry has been raised with the goal of creating more eco-friendly transportation by reducing fuel costs and the negative environmental effects of harmful gases. Among the different green transportation solutions, solar energy has shown to be a reliable source for maritime energy applications. Solar photovoltaic (PV) panels can be installed on ships to generate electricity, which will be utilized to supplement the diesel generators and reduce the amount of power needed from these machines. Dynamic Reconfiguration (DR) and Maximum Power Point (MPP) tracking in PV systems are important for maximizing power output. Each panel must include a significant number of voltage and current sensors in order to be reconfigured, which increases costs, expands the size of the installation and lowers installation reliability. With the aim of reducing the number of sensors and analog to digital converters image-based methods can be used to reconfigure PV systems and enhance MPPT solutions and diagnostics. The possibility of predicting electrical data of PV panels from RGB images using Machine Learning (ML) techniques is discussed in this paper.

KEY WORDS

PV panels, Machine Learning, Predicting, Relevant to, RGB images.

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How Important is Training in Marine Firefighting Equipment - SCABA?

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Basic fire protection on ships is organized in such a way that the duties of each crew member are determined by the Master list, depending on the nature of the emergency situation, including a fire on board. Accordingly, it has been determined which crew members should use the breathing apparatus (BA) set in case they need to rescue someone or extinguish a fire in enclosed and smoky spaces of the ship. The question or problem arises as to how well these crew members are mentally and physically prepared for such complex emergency situations. Companies and even shipboard management do not conduct detailed analyses of their crews on this issue. It is sufficient that the crewmember has a valid medical examination and firefighting certificates, and it is assumed that he or she can be entrusted with such a task. For this reason, during the above-mentioned event, an examination was conducted using a breathing apparatus, a fireman outfit and a portable fire extinguisher. By measuring blood pressure, body weight, and heart rate, an attempt was made to determine how stressful the use of firefighting equipment can be for an involved crew member. A certain number of maritime school students (4th grade), maritime faculty students. The measurements were performed in such a way that the mentioned parameters were recorded before and after donning the firefighting equipment, with a note about the age and whether the candidate was an athlete, smoker or non-smoker. After donning the firefighting equipment, each candidate climbed the stairs to the second floor of the Maritime Faculty building and simulated extinguishing a small fire with a portable fire extinguisher (CO_2 weight 9 kg). By analysing the data obtained, an attempt will be made to determine if the above measurements change in relation to simulated extinguishing of small fires. In this way, an attempt is made to provide guidelines that could increase safety in the use of these firefighting equipment and, consequently, safety on board in general.

KEY WORDS

Safety at sea, Firefighting outfit, BA set, Master list, Readiness/fitness for firefighting duty.

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Public Service Compensation and Prolongation of Public Service Contracts in the Maritime Transport Sector under European Union Law in the Case of COVID-19

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The COVID-19 pandemic minimized the mobility of European Union (hereinafter: EU) citizens and businesses by sea and caused disruptions in the maritime supply chains. Consequently, the EU designed a series of measures to protect mobility and connectivity in Europe. This paper is dedicated to the analysis of the measures concerning the award of public service compensation to the maritime transport operators (shipowners) with whom Member State concluded public service contracts or imposed public service obligations (prior to or after the outbreak of the COVID-19 disease) in order to ensure the regular provision of the maritime transport services. Maritime transport services covered with these measures are freight and passenger transport, provided whether as cabotage or transport between two or more Member States or between EU and third country. The objective of the paper is to discuss and analyse under which conditions these measures do not constitute State aid or can be exempted from the *ex ante* notification to the Commission and a public contract concluded for the provision of the maritime transport services may be prolonged without a new award procedure and whether these terms are applicable also in case of other exceptional occurrences (such as wars, global economic crisis, etc.). In this context, relevant EU Law will be analysed: sector-specific rules on the provision of maritime transport services (Regulation 3577/92 on the provision of maritime cabotage services and Regulation 4055/865 on the provision of international maritime transport services), EU State aid rules (criteria established in the *Altmark* judgement), applicable rules on public procurement (Directive 2014/23/EU and Directive 2014/24/EU) and lastly, Working document issued by the departments of the European Commission for information purposes in response to the COVID-19 crisis.

KEY WORDS

Public service compensation, Public service contract, Public service obligation, Maritime transport services, Prolongation of public contracts, Exceptional occurrences.

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The Salient Features of the Inchmaree Marine Insurance Clauses

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An "Inchmaree Clause" is a special contractual clause contained in the standard hull and machinery insurance clauses of the London insurance market. It includes risks that are not directly related to the perils of the sea. Thus, for example, damages or losses occurring because of a broken shaft, bursting of boilers, a latent defect in the hull, equipment, or machinery, as well as those resulting from a navigation error, negligence of the master, officer, crew, or pilot etc., are included under the insurance coverage by virtue of such a clause. This type of standard marine insurance clause was named after a ship called "Inchmaree" involved in an English court case – Thames & Mersey Marine Insurance Co Ltd v Hamilton, Fraser & Co. ("The Inchmaree") of 1887, in which the court ruled that damage to a ship's pump due to the accidental jamming of a vent was not due to any of the marine risks or other eiusdem generis risks covered by the standard hull and machinery insurance policy and was therefore not indemnifiable thereunder. Thus, it became obvious that there are numerous risks that the insured ships are exposed to during navigation, which are not covered by a standard hull and machinery insurance policy. The London insurance market reacted to such a development of law and incorporated a new, so-called "Inchmaree Clause" into the standard Institute hull insurance clauses. The content of the clause has changed over time with the introduction of new risks under insurance coverage. The aim of this paper is to analyse the background and purpose of the "Inchmaree" clauses contained in the broadly used standard insurance clauses and to study their salient features. Given that the clause was originally created in the English legal framework, the study entails an analysis of the relevant English case law, statutory law, and legal doctrine. The paper also discusses the legal issues related to the possible application of those or similar clauses in the context of marine insurance contracts governed by Croatian law. A short comparison is made to the corresponding solutions found in the Nordic Marine Insurance Plan.

KEY WORDS

Marine insurance, Institute Time Clauses – Hulls, International Hull Clauses 2003, Inchmaree Clause, Crew negligence, Machinery damage.

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Research on the Basis of Maritime Labour Convention of Defects in Seafarer Changeover by the Effect of the COVID-19 Pandemic

Zeki YAŞAR

The Covid-19 global pandemic has intensely demonstrated how vital international maritime transport is for humanity's access to basic needs. The volume of global trade, which has reached seventy percent, is still realized with the possibilities of maritime trade. Around one hundred and fifty thousand seafarers working on international trade ships need to changeover every month. The reason for this changeover is to ensure the health and welfare of the seafarer, as well as a requirement of international maritime conventions. During the Covid-19 pandemic, seafarers faced problems such as getting a visa, joining or leaving the ship, airline transportation, ship crew changeover, and prolonged employment contracts. Although there are many sub-reasons of the problems experienced, the necessity of changing the seafarers draws attention as the most common topic, as the duty is carried out with a term employment contract. In order to draw attention to the problems encountered and to direct the countries to take precautions, declarations of relevant international organizations have been published. In this study, especially the seafarer's job change was emphasized, and the negative effects of the strict measures taken to prevent the spread of the pandemic were examined. On the one hand, while the supply chain is not deteriorated, on the other hand, it is examined that the pandemic measures are required to be taken completely and the process of joining or leaving the seafarers becomes impossible. The loss of rights of seafarers who could not leave the ship even though their employment contracts were terminated were examined on the basis of the International Maritime Labour Convention (MLC) and administrative conclusions were drawn from the experiences. The findings obtained as a result of face-to-face written interviews and surveys conducted with seafarers who are citizens of different countries were compared. Common problems were discussed over MLC and recommendations were made to policymakers by making determinations from the experiences gained.

KEY WORDS

Pandemic, Epidemic, Covid-19, MLC2006, Seafarer, Repatriation, Maritime Policy.

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Right of Control in Carriage of Goods by Sea – New Approach of Rotterdam Rules

Vesna Skorupan Wolff

In current Conventions on the carriage of goods by sea (Hague Rules, Hague-Visby Rules and Hamburg Rules), there is no legal concept of right of control. The United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea ("Rotterdam Rules") has for the first time adopted the concept of the right of control for the carriage of goods by sea. The Rotterdam Rules adopted by UNCITRAL in 2008, has the ambitious goal of restoring the uniformity of the law governing the international carriage of goods by sea.

The object of the examination is recent solutions in respect of defining and prescribing the rights and liability of the controlling party. The article deals with the identity of the controlling party; the exercise and extent of the right of control; the duration of the right of control and the carrier's execution of instructions as important issues which affect the regime of the carrier's liability. The relation of the Rotterdam Rules towards other conventions which regulate the carriage of goods is also analyzed. Different points of view and opposing arguments regarding the legal concept of the right of control are emphasized and commented. Also, other important innovations regarding the concept of controlling party are pointed out.

Rotterdam Rules attempts to regulate in a comprehensive and contemporary manner the question of rights of controlling party and control of goods in transit. New concept of the right of control is introduced in order to satisfy contemporary conditions of maritime activities. Advantages which are expected to be achieved by this new concept of controlling the goods in transit are presented, but the solutions which could present obstacles in its incorporation into the regulation of carriage of goods by sea on the international level are also presented.

KEY WORDS

Carriage of goods by sea, Rotterdam rules, Right of control, Controlling party.

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Prevention of Maritime Pollution in Montenegro through Legal Solutions

Jelena Nikčević

The determination of Montenegro as a coastal and ecologic state is to ensure and respect international standards in the marine environmental part as a part environmental in whole. One of the mechanisms for effective protection of the marine environment from pollution from vessels is an adequately designed national protection. This paper presents a part of the Montenegrin legislation concerning the prevention of maritime pollution from vessels, taking into account general, special (preventive) and specialized regulations on sea protection. The paper discusses specific Montenegrin solutions concerning the prevention of maritime pollution from vessels, taking into account general, special (preventive), and specialized regulations on marine protection. The necessity of harmonizing Montenegrin legislation with the maritime acquis of the EU and have not been transposed/incorporated into the Montenegrin legal system and review of international conventions of which Montenegro is a part. In the conclusion, guidelines are given for the future development of Montenegrin legislation.

KEY WORDS

Prevention, Maritime pollution, Vessels, Legal regulations, Montenegro, Law.

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Implementation of European Union Law in the New Act on Liner Shipping and Seasonal Coastal Maritime Transport

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The new Act on Liner Shipping and Seasonal Coastal Maritime Transport was adopted in 2022. It regulates the system of public liner maritime transport, which ensures regular maritime connections between inhabited islands and the mainland, and among inhabited islands. The new Act is fully harmonized with the regulations of the European Union. The Act adopts, into the Croatian legislation, Decision 2012/21/EU on the application of Article 106, paragraph 2 of the Treaty on the Functioning of the European Union to State aid in the form of public service compensation granted to certain undertakings entrusted with the operation of services of general economic interest. Furthermore, the Act ensures the implementation of the European Union act relating to the application of the principle of freedom to provide services to maritime transport within member states (maritime cabotage) – Council Regulation (EEC) No 3577/92 and the European Union act relating to the rights of passengers when travelling by sea and inland waterways – Regulation (EU) No 1177/2010. The paper specifically analyses the regulations of the European Union governing state aid in public liner maritime transport and the judgments of the Court of Justice of the European Union in case C-208/00 Altmark and case T-454/ 13 – SNCM.

KEY WORDS

Public liner maritime transport, Act on Liner Shipping and Seasonal Coastal Maritime Transport, European Union regulations, Judgment of the Court of Justice of the European Union in case C-208/00 Altmark, Judgment of the Court of Justice of the European Union in case T-454/ 13 – SNCM

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Comparison of the Different Compass Types Used in Navigation

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Technological developments in maritime transport over the last twenty years have led to major changes in the way navigation is carried out at sea. The use of modern navigation equipment such as an Electronic Chart Display and Information System (ECDIS) has led to less or no use of paper nautical charts. Attitudes towards traditional methods of determining position, i.e., the use of once indispensable devices such as sextants or chronometers, have also changed. Parallel to the development of navigation devices, new, modern and extremely reliable compasses have been developed and put into use. This article explains the different types of compasses used in maritime navigation, their design, operating principles, their possibilities, and their limitations. It highlights the advantages and disadvantages of magnetic, gyro, and electronic compasses, which are most commonly used on ships. It also discusses various methods of compensating for compass errors and the technical modifications required to make them error-free. The results of the survey based on 193 respondents show that most ships still use magnetic and gyro compasses as their primary aids to navigation, while electronic compasses are becoming more popular due to their reliability and maintenance advantages but are rarely used on SOLAS ship.

KEY WORDS

Maritime navigation, Magnetic compass, Gyro compass, Electronic compass, Survey.

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Raising the Level of Navigation Safety Using the AIS System

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The marking of waterways and other navigational hazards has a crucial role in maintaining a high level of navigation safety at the sea. The aforementioned use different types of equipment, installed on maritime signaling facilities and based on different technologies, but all of them are not applicable in all conditions and micro-locations. In addition to the classic, i.e., visual ways of marking maritime signaling facilities, in recent times the use of electronic aids to navigation has become increasingly widespread. Among the electronic aids for marking maritime signaling objects, the most prominent application is the AIS (Automatic Identification System) system, which is used, among other things, for navigation, meteorology, data transmission, and many other applications. This work analyzed the functioning of the AIS system and AIS AtoN devices on maritime signaling facilities.

KEY WORDS

Safety of navigation, Automatic Identification System, Navigation, AtoN, Communications.

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Anchoring Semisubmersible Platforms

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Anchor handling is a complex and dangerous job that involves stretching anchor chains, dropping and lifting, and lifting multiple anchors, sometimes in bad weather conditions. Complex operations with anchors can be done successfully only by people with experience in these jobs. Any error when anchoring platforms can have disastrous consequences, cause extensive material damage, cause environmental disaster, and lead to human casualties. This paper explains the procedures for anchoring semisubmersible platforms for exploiting gas and oil from the seabed. Some platforms are anchored with a dozen or more anchors, which requires anchor handling operations to be performed by two AHTS (Anchor Handling Tug Supply) ships simultaneously, with mutual coordination and cooperation with the crew on the platform, release or heave anchor lines (wire lines). In this demanding job, routine, experience, and safety are achieved over time in these complex operations.

KEY WORDS

Anchoring, Mooring, Towing, Semisubmersible platform, Anchor, Anchor handling tug supply vessel

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Neglection of Sailboat Day Shape – Theory and Practice

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The International Regulations for Preventing Collisions at Sea (COLREGs - Rules) from 1972, in rule 25 paragraph e), state the following: "A vessel proceeding under sail when also being propelled by machinery shall exhibit forward where it can best be seen a conical shape, apex downwards". These Rules are adopted in order to maintain adequate level of safety of navigation at sea and they show that the day shapes required by these Rules are an integral part of sailing rules. However, observing the traffic in Adriatic Sea during summer period when the number of the sailing vessels is at its peak, it can be seen that some of the Rules are not obeyed, mostly regarding the exhibition of day shapes. In accordance with before mentioned observation it can be stated that Rule 25, paragraph e, is usually never being obeyed by sailing boats. Proving that statement was the main goal of this paper. The research was conducted at Zadar County area by visual observation and by distributing questionnaire among seafarers, sailors and skippers. Visual observation results showed that in 3 months period during summer season, in all weather and visibility conditions, conical shape with apex down has never been spotted on a sailing boat. Also, the questionnaire showed that most sailors are not familiar with the meaning of day shape which consists of a conical shape with apex down. These results indicate low level of knowledge of basic COLREGs parts, and it can be concluded that better education should be applied towards sailors, sailboat skippers, seafarers and staff in marinas.

KEY WORDS

COLREGs, Sailing vessels, Day shape, Safety.

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Analysis of Accidents on Non-SOLAS Vessels

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The number of non-SOLAS vessels has increased today for several reasons. Most of these vessels are used seasonally. For this reason, maritime traffic increases significantly during the summer months, and in comparison, the number of maritime accidents also increases. The causes and reasons of maritime accidents involving non-SOLAS vessels may differ from accidents involving SOLAS vessels. These causes and reasons can range from structural and technical to technological aspects, usually related to the human factor, since a relatively large number of non-SOLAS vessels are not operated by professional seafarers.

This paper analyses the causes of maritime accidents on non-SOLAS vessels in the European Union (EU) and in the Exclusive Economic Zone (EEZ) from 2015 to 2019 using official data from the European Maritime Casualty Platform (EMCIP), the Marine Accident Investigation Branch (MAIB), and the Air, Maritime and Railway Traffic Accidents Investigation Agency (AIN).

By comparing the same types of maritime accidents in different areas, the related causes and characteristic patterns of these accidents are identified and possible recommendations to increase the navigational safety of non-SOLAS vessels are proposed.

KEY WORDS

Non–SOLAS vessels, Maritime accidents, Accident causes, Safety of navigation.

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Adjustment of Records: A Global Cross-sectional Survey on the Implementation of Work and Rest Regulations at Sea

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Introduction: Fatigue among seafarers has received adequate research attention over several decades, yet it remains under-addressed, making it a growing concern. Currently, the work-rest regulations of the IMO/ILO are the sole indicators of fatigue in this population. However, recent research has raised concerns regarding the implementation of these regulations, including reporting and compliance.

Method: The study utilized quantitative research to survey seafarers worldwide. An online cross-sectional survey captured seafarers' experiences with the implementation of work-rest regulations. In particular, the survey inquired about their recording practices, compliance with work-rest regulations, and actions in response to non-compliance.

Results: Out of the 4287 seafarers' responses, most (77.2%) used computers to complete their records. Eighty-six percent (85.9%) of seafarers reported exceeding work-rest regulatory limits at least once a month, with an average of 7.0 non-compliance per month. Despite this, a significant proportion (49.9%) chose not to report these incidents to their company. Forty-six percent (46.4%) reported that their companies did not respond to their concerns, while 67.1% reported that senior onboard officers were questioned about their work-rest hours management by the company. Only 31.5% admitted to accurately reflecting the record. The primary reasons for adjusting the records were to avoid findings during inspections (80.3%) and problems with the company (75.1%). Sixty percent (60.1%) of the seafarers stated that their company expected them to adjust their records, with 48.9% reported making adjustments on the company's instructions. Only 21.8% reported that their ships were provided with additional workforce.

Conclusion: A large-scale survey showed that seafarers and shipping companies prioritized following record-keeping procedures over addressing work-rest compliance challenges. The adjustment of records hinders accurate reporting, leading to a false sense of compliance with the regulatory framework applied by seafarers to manage their fatigue.

KEY WORDS

Seafarer, Fatigue, Working time, Work-rest records, Falsification of records, Adjustment of records.

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Safety Learning Culture in Shipping Takes Two: Data Quality and Trust

Raphael Baumler, María Carrera

Background: Learning culture requires the capacity to assess safety situations, draw accurate conclusions and willingness to implement recommendations. Such a culture necessitates effective feedback and feedforward mechanisms between reporters, managers and authorities on safety-related data.

Objectives: Assessing the current status of safety culture and learning culture in shipping and identifying needs to enhance safety learning culture.

Methods: The EU-funded project SAFEMODE has conducted a qualitative study based on in-depth interviews with seafarers and casualty investigators as well as focus groups with regulatory bodies, safety agencies, shipping companies and maritime education and training institutions.

Results: The study: 1) identifies the main barriers to overcome to facilitate reporting and enhance learning in daily operations, 2) reviews the critical ingredients of a safety learning culture for shipping, and 3) proposes recommendations for the industry to move from a reactive to a proactive safety culture.

Conclusion: Data quality and trust are conditions for an effective reporting system and the establishment of a strong learning culture for the shipping industry. Low-quality data affects feedback/feedforward accuracy and models to learn from. The study suggests strengthening reporting mechanisms by establishing trustful relationships between front-line operators, shore-based management and authorities.

KEY WORDS

Human factors, Safety learning culture, Learning culture, Data quality, Trust, Casualties.

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Correlations Between Aviation and Maritime Safety Management Systems

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The notion of safety is a very complex set of phenomena within the system that are interconnected in a unique and very complex way. The main objective of any safety management system is to prevent accidents and adverse events, hence safety management system has to be able to process, monitor and improve safety performance of an organization. Aim of the paper is to determine compatibility between aviation and maritime safety management systems through analysis of three top safety management areas, i.e., framework of each safety management system, safety risk management processes, and safety methodologies and performance management. Determining systems' compatibility, opens up the possibility to use certain techniques implemented in aviation safety management and implement them in maritime safety management in order to improve its efficiency.

KEY WORDS

Correlations, Aviation, Maritime, Safety, Management, Systems.

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Maritime Accident, Incident Analysis Methods: A Systematic Literature Review

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Incidents and accidents in the maritime sector always cause the unavailability of entities and services and significantly impact the performance, finance, usability, and ambience of the service. Hence the formulation of accident analysis methods and models is gaining importance. It is required to get an overview of all existing analysis methods and models to find any overarching methods and commonalities between models. Accident analysis methods have greater application in many industries and many methods are applied to the maritime industry cases. Furthermore, it is required to find out any methods that had been applied to maritime incidents. In this article, a systematic literature review of incident and accident analysis methods tried to establish across domains. As several accidents happen irrespective of all kinds of obligations to regulatory statutes, it has been found that accident analysis methods have elevated gaining attention over the last 20 years, resulting in a surfeit of methods and models. There are three classes often found in existing literature, they are the sequential method, epidemiological method, and systemic method. Each class has its features, advantages and disadvantages. The sequential method may be easier to understand and communicate, can be executed in less time, but may miss vital underlying causes. The epidemiological method is time-consuming but can identify and resolute the underlying cause which may prevent future mishaps. A systemic method is rightly used for complex situations but needs a lot of time and resources, rendering this an expensive method. Finally, for maritime incident or accident analysis, any structured methods and models are not defined; also, any specific method does not apply to the whole maritime sector.

KEY WORDS

Maritime, Accidents, Incidents, Literature, Methods.

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Ability of the Coast Guard Respond to Marine Pollution Incidents in the Exclusive Economic Zone due to Increased Maritime Traffic

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Perseverance and existence of the Republic of Croatia is largely determined by its maritime orientation. Apart from natural, historical and cultural importance of the Adriatic Sea, it also has strategic importance since it represents one of the key economic resources. In the current context of the high uncertainty of energy supply through the existing corridors, it is being foreseen that the countries of the European Union will increase the supply by sea through the Adriatic Sea. The increased maritime traffic also results in a higher probability of maritime incidents. Croatia, Slovenia and Italy have recognized the degree of potential risk of marine pollution incidents, especially in the area of the Adriatic Sea, and catastrophic consequences thereof. Hence, on the basis of this, in addition to the national systems for accidental marine pollution preparedness and response, they have accessed joint prevention activities at a sub-regional level. This paper analyses the existing model of the contingency management in the Republic of Croatia, as well as some of deficiencies that reduce the ability to manage interventions in the event of accidental marine pollution, especially in the area of the Exclusive Economic Zone of the Republic of Croatia. Furthermore, it shows the importance and the role of the Coast Guard of the Republic of Croatia as a bearer of maritime safety and an important instrument for the prevention, restriction, preparedness and intervention in case of accidental marine pollution, especially in the area of the Exclusive Economic Zone of the Republic of Croatia, and its current capability to respond to requirements of the marine protection system.

KEY WORDS

Accidental marine pollution, Coast Guard of the Republic of Croatia, Exclusive Economic Zone

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Analysis of Operational Time and Costs of Offshore Vessels and Correlation with the Crude Oil Price

Ivica Skoko, Marijan Zuijć, Zlatko Boko

The offshore oil & gas industry is one of the fastest growing industries in the world and high demand for such type of energy has moved exploration beyond shallow water to deep water. Offshore supply vessels (OSV) are an indispensable part of exploration, drilling, production, and finally reloading of newly discovered and produced crude oil. Proper planning of the offshore fleet is an essential part of the offshore logistics chain and has a direct impact on a Company's projects and as such a significant impact on the project budget. With available data from the real sector in the work is given the actual operational use of the vessels in comparison with their monthly and annual costs. The analysis will be carried out for the two main types of offshore vessels, Anchor Handling Tug Supply (AHTS) and Platform Supply Vessels (PSV). The correlation between a crude oil price and an AHTS daily hire rate will also be presented.

KEY WORDS

Offshore vessels, Operational time, Offshore activities, Hire costs, Crude oil.

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Empty Container Repositioning in Port of Gothenburg Hinterland

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Empty container repositioning (ECR) is an increasing problem in containerized transport chains due to trade imbalances which are inevitable with the current demand patterns, and as such ECR cannot be eliminated completely. However, trade imbalances are not the only factor affecting empty container repositioning; other factors that affect ECR are dynamic operations, uncertainties, size and type of equipment, lack of visibility and collaboration within the transport chain, as well as transport companies' operational and strategic practices. Therefore, the purpose of this paper is to investigate ECR dynamics in order to reduce unnecessary movements, to contribute to more sustainable hinterland transport system. The same has been studied on a case of Port of Gothenburg and its hinterland in Sweden. The primary data has been collected through two rounds of interviews with 10 companies involved in the port's ECR operations: shipping lines, land-based transport operators, terminal operators and forwarders. The findings show that there are two main drivers for improvements of ECR: financial and environmental. Nevertheless, there are nine barriers such as technical imbalances, dynamic operations, blind spots, strategies and operational practices, container fleet size, number of actors involved, contract types and uncertainty factors. The identified barriers only further highlight the complexity of containerized transport chain. The results of the study also indicate 14 different suggestions for potential improvements, i.e., how to mitigate the identified barriers. However, there is no one single solution that is feasible for all barriers for all actors involved. This study contributes to better understanding of issues related to ECR in the port's hinterland by matching the barriers with possible solutions to overcome them; altogether facilitating the management of ECR.

KEY WORDS

Empty container repositioning, Container transport, Drivers, Barriers, Port, Hinterland.

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Cemex Croatia Rail Transport in Period 2011-2021

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Cement plants Sv. Juraj and Sv. Kajo has produced cement since the beginning of the 20th century. Both plants are based in the Dalmatian area with direct connection to the rail transport grid. Rail transport connects CEMEX Croatia plants with CEMEX Croatia terminals in the northern part of Croatia and Bosnia and Herzegovina. This research paper analyzes the 2011-2021 total cargo quantities moved by rail transport and managed by CEMEX Croatia. There is also an overview of the technology used for loading and unloading cement, available storage capacities at terminals, and rail technology used for cement transport. Furthermore, based on actual data, this paper gives an overview of possible development tendencies considering the possible market approaches.

KEY WORDS:

Sv. Juraj plant, Sv. Kajo plant, CEMEX, Rail transport, Cement.

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Sustainability in Maritime Container Transport Technology

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Containerisation has changed the world and enabled modern globalisation. The invention and usage of containers notably facilitated and expedited the transportation of various commodities and enabled enormous progress in transport technology. However, in addition to all its advantages, container shipping by sea also has disadvantages, such as emissions of noxious gases, which pollute the environment and negatively affect people's health. Therefore, it is necessary to make the transport of containers by sea more environmentally friendly and sustainable. The paper presents the most prominent methods by which container shipping by sea is evolving to be more sustainable. The authors reviewed and used available literature dealing with techniques like reducing energy consumption, navigating at a reduced speed or optimising the sailing route. In addition, methods like using alternative energy sources for the propulsion of container ships, such as liquefied natural gas, and measures undertaken at container terminals, are presented. Moreover, automation and digitalisation of the transport process, along with using smart containers, are introduced. Digitalisation and smart containers are considered the future of containerisation and represent the path toward a sustainable and safe technology for container shipping by sea.

KEY WORDS

Containerisation, Maritime transport, Sustainability, Smart containers, Container terminals.

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Port Infrastructure Construction Projects for Sustainable Intermodal Passenger Transport in the Port of Split

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Road congestion is a principal problem, especially in port cities. It wastes passengers' time and consumes more fuel than other modes of transport, making it environmentally unsustainable. The number of vehicles passing through the Port of Split increased two and a half times in the last two decades. Vehicle traffic to the City Port Basin is one of the leading causes of traffic congestion in the city centre and environmental pollution. In the latest two decades, the Port of Split Authority doubled the operational area in the City Port Basin to allow for optimal traffic flow. There are also potential challenges due to the expected significant growth in vehicle traffic. Intermodal transport could solve the problem of road congestion, and ports could play a notable role in this process. The paper examines the hypothesis of whether port infrastructure construction projects by the Port of Split Authority contribute significantly to sustainable intermodal passenger transport in the Port of Split, the City of Split and Split-Dalmatia County. The methods used are case study and descriptive statistical analysis. The paper could provide information and initiatives in the transport sector, especially maritime transport, and propose topics for academic discussion. The projects in the Port of Split shorten the waiting period for vehicles and reduce fuel consumption to be more environmentally beneficial than today. The Port of Split Authority has already used and intends to continue to use all available resources, including the port area, to shift traffic from road to sea through the construction of new port infrastructure for RoRo vessels and trucks in the Stinice area and catamarans in the Resnik area. These efforts can only make the optimal contribution with synergy with other stakeholders. These include the state-owned company ''Hrvatske ceste'' for better access roads, the railroad company - ''Hrvatske željeznice'' for the railroad network expansion to the Split Airport and shipping companies, which must be ready to include new lines with enough vessels. Under the current circumstances, the results show that the construction projects of the Port Authority Split contribute to sustainable intermodal passenger transport in the Port of Split, the City of Split and Split-Dalmatia County.

KEY WORDS

Passenger port, Maritime traffic, Port infrastructure, Sustainable development, Intermodal transport, Motorways of the sea

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Advanced Construction and Technology Solutions for Heavy-Lift Vessels

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Transport of heavy loads by sea has resulted in the revolutionary modernisation of technologies dedicated for their carriage and handling. As the transport of out of gauge products in one piece is, from the standpoint of many producers, more favourable than assembling them at their destination, the demand for such shipping service has led to construction of special vessels. Due to specific cargoes they carry, the design of these vessels is quite different from the construction of standard merchant ships. Heavy-lift vessels are designed to load and carry various heavy out of gauge cargoes that cannot be otherwise transported by conventional cargo vessels. Their features include the very delicate stability, especially while loading and unloading heavy out of gauge cargo, and the dimensional accuracy of making and assembling the members forming the hull's structure, cargo hold structure, and hatch covers of the tween deck and main deck (Brodosplit d.d., 2008; Medić, 2021). The purpose of this paper is to examine the cutting-edge construction and technology solutions applied in building the heavy-lift vessel *Fairmaster*, operated by *Jumbo Shipping*, with special focus on her cargo handling system, cargo storage principles, and her stabilising system featuring two floating pontoons (Brodosplit d.d., 2008; Medić, 2021).

KEY WORDS

Construction, Technology, Transport, Stability, Tonnage, Deck cranes, Heavy cargo.

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Reconversion of Port Spaces in the Cities and Surroundings of the Ports in Panama. Statistical Study of Traffic and its Impact, Proposal for Improvement

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Panama is a country with a privileged geographical and climatic position, which has allowed it to develop as a center/hub of the Americas. The economy is mainly based on the service sector that includes the Panama Canal, and ports and related activities such as the Colon Free Zone, tourism and airport services, and the International Banking Center. As part of Panama's port logistics development, there is a container transfer system from the Pacific to the Atlantic by road or rail. Currently, the road infrastructure does not have perfect conditions, consequently this does not allow it to generate good logistics performance between the final destinations and the different ports that they serve. For this reason, the ports around the Atlantic and Pacific entrances of the Panama Canal have specialized in the movement of containerized cargo and have developed one of the most recognized transshipment centers in Central America. The objective of the study presented in this initial research proposal is to carry out a bibliographic review. Know the literature that has been written about the main effects on the maritime or access zone, the land or maneuvering zone, and the liaison zones with land transport, which are causing a delay in the mobilization of trucks, in the Panamanian Pacific. The methodology of this work was to carry out an exhaustive bibliographical review of the literature on the effects of waiting times, described by the media, magazines of the maritime sector, and especially how the institutions have generated improvement plans for a development to long-term needs of the sector maritime. The results obtained are the contributions of all those involved in the maritime sector, both the private sector and the state, who seek to improve the process that is currently being developed in the Pacific ports. In conclusion, a series of recommendations of the contributions of the private sector and state institutions are proposed, such as the strengthening of the legal framework, improving the management, exploitation, and promotion of infrastructure, are the goal in which the two sectors agree. Who are analyzing the problems suffered by the infrastructure of the Pacific ports.

KEY WORDS

Optimization, Ports, Waiting time, Movements

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The Lika Railway as a Constraint Factor of Maritime Freight Transport in Dalmatian Ports

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Maritime freight transport in Dalmatian ports is of strategic national and regional importance. However, due to omissions in providing essential investments, it is seriously jeopardized by the limitations of the rail infrastructure on the Lika railroad. These deficiencies are mainly reflected in the higher train costs per transported ton compared to the other routes. It is a direct consequence of unfavorable line topography, limited demand, and high energy consumption of diesel locomotives. The paper examines the competitiveness of rail transport on the Lika railroad line by focusing on the cost of energy used and providing an analysis of the fuel types available to power locomotives. In addition to the lack of competitiveness of diesel-powered freight transport, the extent of savings from electric and hydrogen-powered transportation is notable. The fuel conversion cost and electrification are also mentioned. By introducing green hydrogen production technology, the Republic of Croatia could permanently solve the limitations of rail transport in Dalmatian cities and become a regional leader in hydrogen.

KEY WORDS

Lika railway, Dalmatian ports, Port competitiveness, Hydrogen

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Autonomous Shipping: Current Status and Main Barriers to Large-Scale Diffusion

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Maritime Autonomous Surface Ships (MASS), in essence the maritime equivalent of autonomous vehicles, is a very interesting development. Different MASS applications are suggested, but there is confusion about the technology and its added value among practitioners and researchers. MASS faces many barriers to reach large-scale diffusion which are neither mapped nor fully understood in the maritime sector and academia. Based on literature review and interviews with maritime practitioners and MASS researchers, this article compiles a short history of MASS, which helps to identify current niche market applications in commercial shipping and to determine the current pre-diffusion stage of MASS. The state-of-the-art list of MASS barriers to large-scale diffusion from academic literature and maritime practitioners are analyzed to establish which key barriers prevent MASS from large-scale diffusion. Practitioners confirm the barriers identified in academic literature yet identify extra barriers for large-scale diffusion of MASS which are not yet addressed in academic literature. The article concludes that MASS has limited effect on reducing costs and is facing institutional and market rather than technical barriers to large-scale diffusion, with many of them revolving around the effect of MASS on various aspects of maritime safety.

KEY WORDS

Maritime Autonomous Surface Ships (MASS), Large-scale diffusion, Barriers, Market.

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Strength and Performance of a Composite Gilson Mast for Steel Deck Fishing Vessels

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This work presents a framework for findings on the modelling effort to re-design of a 35 tonnes Gilson Mast (GM) profile for a fishing vessel attached to A36 steel deck. Full-scale finite element analysis of steel deck with GM attached is performed via ANSYS static structural and ACP modules. An example case study for material, sub-laminate selection and identification of failure locations taking Tsai-Wu based effective material properties and first ply failure safety factors is provided. The material selection was made with 7 different commercially available laminate candidates with three different sub-laminate sequences such as $(0)_{16}$, $(36/\text{-}36)_{4s}$ and $(54/\text{-}36/\text{-}36/\text{-}54)_{2s}$. Following that a pre-defined material in ANSYS is used to explain the changes in the modes of failure and potential reinforcement strategies. Results suggested that strength-wise CFRP materials are suitable for GM application and may provide weight savings up to 490% even when they are considered as completely brittle materials with no progressive failure. Furthermore, found failure locations due resulting in material failure are local which means they can be easily engineered with additional structural members.

KEY WORDS

Steel, Composite, Structural analysis, Fishing vessel, Gilson mast

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Estimation of CO_2 Reduction due to Flettner Technology based on Online Calculator for Panamax and Capesize Bulk Carriers

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A variety of technologies are available to help achieve the IMO vision, which states: "reducing GHG emissions from international shipping and, as a matter of urgency, aims to phase them out as soon as possible in this century". The following technologies are available: Air lubrication systems, wind assisted technologies (kites, Flettner rotor, rigid sails), solar energy, waste heat recovery, hull coating, bow optimization, post-swirl fins, renewable fuels. In this paper, we focus only on Flettner rotor technology. Flettner rotor technology was first introduced in 1924. Technology implies a rotating cylinder mounted on the deck of the ship to provide additional thrust. The application of the technology ended in the 1930s. In 2010, the first commercial ship with Flettner rotors entered service, and nine more ships with Flettner technology entered service by 2023. Calculating fuel and therefore CO2 savings on routes is a complex task, as many factors must be considered: Wind conditions, number of rotors, vessel type (vessel data), speed, etc. This paper examines the Flettner Rotor Saving Calculator, a software developed by Lloyd's Register, for Panamax and Capsize bulk carriers.

KEY WORDS

Flettner rotor, Bulk Carrier, Emission reduction, Lloyd Register software.

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Maritime Alternative Fuels and Technologies for Sustainable Future

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Globally, 97% of ships are powered by traditional systems and fuels, but new IMO regulations are forcing us to look at new alternative energy sources and technologies. As early as 2030, 5% of energy for shipping is expected to come from carbon-neutral fuels, requiring huge investments in onboard technologies and onshore infrastructure. Navigating between options is complex because there is no single 'winner-takes-all' solution. This article considered and simulated various alternative fuels with an emphasis on blending hydrogen into diesel fuels to achieve emission reductions. The analysis was conducted to determine the percentage of hydrogen additives in engines to meet the requirements of the International Maritime Organization (IMO) Tier III regulations. It was concluded that, when the allowable NOx levels are met, higher hydrogen content in the fuel results in lower effective efficiency. The advantages and disadvantages of various new technologies such as dual fuel and hybrid propulsion systems in combination with non-polluting or renewable energy sources were also discussed. Marine energy systems were analyzed with special attention to hybrid systems using hydrogen. Ship hybrid energy system consisting of a fuel cell and a battery as energy sources, with a specific load profile, was presented.

KEY WORDS

Emission regulation, Hybrid propulsion, Alternative fuels, Energy efficiency, Marine technologies.

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