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BOOK OF ABSTRACTS

19th Annual General Assembly (AGA)

of the International Association of Maritime Universities (IAMU)

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PREFACE

This book contains the abstracts presented at the technical sessions of the *19th Annual General Assembly* (AGA19) of the *International Association of Maritime Universities* (IAMU), held at the World Trade Center in Barcelona, Spain, the 17-19 October 2018.

The International Association of Maritime Universities (IAMU) is a global network of leading maritime universities providing Maritime Education and Training (MET) of seafarers for the global shipping industry. IAMU was founded by 7 maritime universities, academies and colleges from 5 countries in 1999 with a shared recognition of the significance of maritime education and training during the rapid globalization of international shipping. Since then, IAMU has significantly expanded its membership to 63 of the world's leading maritime universities and faculties, with The Nippon Foundation as a permanent special member bringing the total to 64 members. IAMU activities are supported by a grant from The Nippon Foundation and annual membership fees from IAMU member.

Comprising all member universities, the AGA provides a unique forum for multilateral discussion of maritime issues. Every year since 2000, IAMU has organized an AGA hosted by one IAMU member university.

The topic of this conference as part of AGA19 was "Time for Action: A new thrust for the future of MET & Research" and the event encompassed activities in the framework to promote communication and exchange between members, interested maritime industry players and international organizations.

This year's Assembly contains 1 invited plenary lecture, 2 invited keynote lectures, and more than 100 contributed presentations during the IAMU technical session and IAMU Student. The programme extends over two days with 3 parallel sessions and poster presentations and two sessions on Development and Research projects. An author index is included at the end.

The conference was organized by the Barcelona School of Nautical Studies of the Universitat Politècnica de Catalunya – BarcelonaTech. On behalf of the organizers, sincere thanks are directed to the International Panel Committee and all of the authors for their combined effort in making AGA19 an intellectually stimulating conference. We also acknowledge the financial support from the sponsors listed on the next page. Finally we appreciate Alessio Bazzanella from the CIMNE Congress Bureau of Barcelona, Spain, for his excellent work in the organization of the conference and the publication of this book.

Barcelona, 1st of October 2018

The Local Executive Committee of AGA19.

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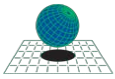

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ABSTRACTS

IAMU TECHNICAL SESSIONS

Electronics and Human Interface

SHIP CYBER SECURITY RISK ASSESSMENT FRAMEWORK

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Keywords: maritime cyber security, ship cyber critical systems, cyber security risk assessment, ship cyber assessment framework, vulnerability scanning, penetration test.

ABSTRACT

Ships are increasingly using information technology and operational technology systems that both rely on digitalisation, integration, automation and networking. With growth in reliance on the information and communication technologies (ICT), there is a compelling necessity to develop mechanism and measures that allow not only protection of data, but as well as safe and reliable ship operations. Recently the International Maritime Organization (IMO) has published the Guidelines on high-level recommendations for maritime cyber risk management [1]. While maritime regulations and policies currently do not adequately govern cyber security in the same way as other aspects of ships security and safety, cyber security risk assessment can be considered as being partly regulated by the IMO ISPS Code [2].

A systematic cyber risk assessment is an essential and integral part of the process for cyber security improvement of ships. Ship cyber risk assessment is a complex set of related and interdependent actions that intersect so as to provide safeguards that are effective and corresponding to challenges presented by ship critical systems specifics (Figure 1), ICT technologies evolution, and human resource

Figure 1. Ship cyber risk critical systems.

capabilities. Cyber risk assessment relies upon determination of ship specific cyber risk factors to be assessed and relations among those factors. Results should provide identification of threats and vulnerabilities in the current deployment of ship critical systems and determination of likelihood and impact magnitude of their exposure caused not only by hardware or software, but also by implemented operational procedures and security policies.

In this work, we present a framework for conducting cyber risk assessment of ships to offer guidance for improving security level of cyber systems onboard their ships. Figure 2 shows the developed framework that relies on guidelines and practices [1-5]. Framework consist of four main segments: (i) assessment preparation operations including ship critical systems identification, (ii) current cyber security assessment conduction and cyber risk determination, (iii) assessment results communication activities necessary for cyber security level improvement, and (iv) cyber risk assessment maintenance activities for ensuring efficiency. The proposed framework is not intended for initial assessment only, but also for periodic implementation to respond to rapid technological changes in a ship environment. Details on the framework segments and elements will be presented. Relations between framework elements together with experimental implementation examples will be discussed.

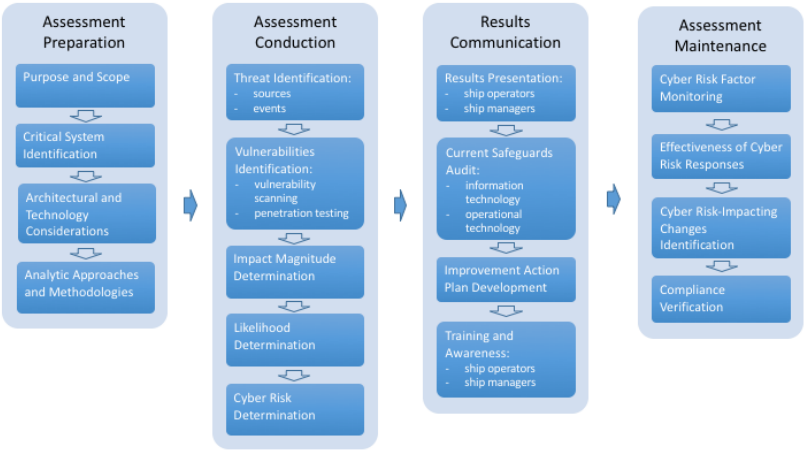

Figure 2. Proposed framework for cyber security risk assessment of ships.

REFERENCES

[1] International Maritime Organization (IMO), "Guidelines on maritime cyber risk management", MSC-FAL.1/Circ.3, 2017.

[2] International Maritime Organization (IMO), "International Ship and Port Facility Security (ISPS) Code", SOLAS/CONF.5/34, 2003.

[3] National Institute of Standards and Technology (NIST), "Framework for Improving Critical Infrastructure Cybersecurity", version 1.0, 2014.

[4] The European Maritime Safety Agency (EMSA), M. Mylly, "Cyber Risks in Maritime Community", High Level Conference on Cyber Security in Civil Aviation, Krakow, 2017.

[5] DNV-GL, "Cyber security resilience management for ships and mobile offshore units in operation", DNVGL-RP-0496, 2016.

Developing a measurement tool for intercultural competence

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Keywords: intercultural competence, higher education, maritime education and training, seafarers

Abastract

Intercultural competence (IC) is an important quality of graduates in higher education (Crossman & Clarke, 2010; Sercu, 2004) and a skill that is highly valued by employers (Lovell, et al., 2015; Jones, 2013; Bird, Mendenhall & Stevens, 2010; Matveev & Milter, 2004). IC evaluates the competence of an individual to adapt to the new environment, culture and people. Intercultural competence is a very important component of communicative competence in the maritime context where effective communication plays a vital role in ensuring safe shipping. The maritime industry as a whole, and maritime education and training institutions in particular, have made great efforts to improve the intercultural competence of maritime professionals with an aim to reduce maritime incidences caused by communication failures. IC has been identified as a critical component of effective communication on board ships where the presence of multi-cultural seafarers is a norm. The increasing number of studies in recent years investigating the education and training needs of seafarers on intercultural competence calls for the development of a common standard to measure the attainment of cross cultural competence among nautical students and maritime professionals. This paper intends to comprehensively review the existing literature on IC as the first step to develop a common standard on intercultural competence taking consideration of the requirements set by the International Maritime Organisation, the needs of employers, and challenges faced by those working in cross-cultural environment.

The dimension of IC consists of three main aspects including cognitive, affective and behavioural. All these dimensions are concentrated on individual thoughts, feelings and action in the social context. The review form the literature reveals that the main components in IC are intercultural attitudes, intercultural knowledge, intercultural skills and intercultural awareness. Intercultural attitudes is a basic interaction between communities, intercultural knowledge is secondary knowledge on how people see a person from different perspectives. Skills emphasis the ability to acquire new knowledge and finally the awareness reflects in-depth understanding on cognition, skills and attitudes. Combination of these components is to produce several of outcomes including flexibility, adaptability, develop an effective and appropriate behaviour and communication skills.

Ruben's (1976, 1979, 1986) Behavioural Approach, European Multidimensional Models (Byram, 1997), Bennett's (1993) Developmental Model, A Culture-Generic Approach (Sinicrope et al., 2007), Anxiety management, An integrative system's theory and Identity negotiation are the main theoretical framework to conceptualised and measure the IC. All these models emphasise skills and abilities of individuals to undergo in developing the abilities of IC.

There are three assessment tools including indirect, direct and mixed assessment tools to observed, understood and accessed skills and abilities. Behavioural Assessment Scale for

Intercultural Competence (BASIC), Intercultural Sensitivity Inventory (ICSI), Intercultural Development Inventory (IDI), Cross-Cultural Adaptability Inventory (CCAI), Global Competency and Intercultural Sensitivity Index (ISI) and Assessment of Intercultural Competence (AIC) are main indirect assessments tools for IC. On the other hand, performance assessment, portfolio assessment and interviews are key tools for direct and combined assessment tools. The literature indicated that implementation of direct and combined methods provided comprehensive results on IC assessment.

Linguistic competence plays a key role to determine the effectiveness of IC application. IC is considered as a lifelong process and there is no rigid point at which one becomes fully inter-culturally competence. Therefore, awareness of the culture difference, effective culture learning, knowledgeable about the elements in the culture, self-adaptation to new culture and understanding key strategies to be acculturated with the host culture are some of important steps for IC development.

REFERENCES

Bennett, M. 1993, *Towards ethnorelativism: A developmental model of intercultural sensitivity*, Intercultural Press, Yarmouth, ME.

Bird, A., Mendenhall, M., Stevens, M. J., & Oddou, G. (2010). Defining the content domain of intercultural competence for global leaders. Journal of Managerial Psychology, 25(8), 810-828.

Byram, M. 1997, *Teaching and assessing intercultural communicative competence.*, Clevedon, UK: Multilingual Matters.

Crossman, J. E., & Clarke, M. (2010). International experience and graduate employability: stakeholder perceptions on the connection. Higher Education, 59(5), 599-613.

Jones, E. (2013). Internationalization and employability: the role of intercultural experiences in the development of transferable skills. Public Money & Management, 33(2), 95-104.

Lovell, C., Kinash, S., Judd, M-M., Crane, L., Knight, C., McLean, M., Mitchell, K., Dowling, D., & Schwerdt, R. (2015). Case studies to enhance graduate employability: Graduate attributes. Sydney, Australia: Australian Government Office for Learning and Teaching, 185-208.

Matveev, A. V., & Milter, R. G. (2004). The value of intercultural competence for performance of multicultural teams. Team Performance Management, 10(5/6), 104-111.

Ruben, B. D. 1976, 'Assessing communication competency for intercultural adaptation', *Group and Organization Studies,* vol. 1, pp. 334-354.

Ruben, B. D. 1989, 'The study of cross-cultural competence: Traditions and contemporary issues', *International Journal of Intercultural Relations,* vol. 13, pp. 229-240.

Ruben, B. D., & Kealey, D. 1979, 'Behavioral assessment of communication competency and the prediction of cross-cultural adaptation.', *International Journal of Intercultural Relations,* vol. 3, pp. 15-45.

Sercu, L. (2004). Assessing intercultural competence: a framework for systematic test development in foreign language education and beyond. Intercultural Education, 15(1), 73-89.

Sinicrope, C., Norris, J. & Watanabe, Y. 2007, 'Understanding and assessing intercultural competence: A summary of theory, research, and practice.', *Second Language Studies,* vol. 26, no. 1, pp. 1-58.

SAFETY AND SECURITY FOR UNMANNED VESSELS THROUGH UPDATING THE RULES OF ANCIENT CREEK ORIGINS? – CAN WE STILL BASE OUR FUTURE RULES ON THEM OR DO WE NEED TO UPDATE OUR WAY OF THINKING ?

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Keywords: Safety, Security, maritime salvage, General Average, Maritime law

SAFETY AND SECURITY FOR UNMANNED VESSELS THROUGH UPDATING THE RULES OF ANCIENT CREEK ORIGINS? – CAN WE STILL BASE THE FUTURE RULES ON THE OLD PRINCIPLES OR DO WE NEED TO UPDATE OUR WAY OF THINKING ?

History of the rules

The Rules on General Average and Salvage were first established by the Rhodians and Rhodian Law 900 BC. General Average was an important part of the law because it gave a certain protection for the cargo-owners if the vessel and the cargo were about to face an accident at sea. The point of the general average law was and still is to give protection in accidents where something extraordinary has to be done in order to save the vessel and/or its cargo from destruction. Rules on salvage were first created to encourage the divers to earn a reward on the basis of the how deep the salvaged objects were and on the basis of their value. The legislation and rules have been developed on the basis of these principles of ancient origin. They have been flexible enough for 3000 years and have been continuously rewritten to meet the demands of the maritime profession and industry. The rules have been encouraging the different interests and participants to do their utmost for the safety and security for both ship and cargo as well as the persons onboard. Decisions and acts have been based on the rules and usually they have been made at sea.

Rise of autonomous seafaring

How can this kind of decisions or acts be made if there is no-one on board to do it, or the vessel is controlled from a great distance without a good perspective of the situation. The act need technical solutions but also development in rules and legislation. In this article, I am handling different kinds of legally problematic occurrences that may appear with unmanned vessels, which are not easy to answer on the basis of existing rules and legislation. It is clear that new development in technology, like autonomous vessels, creates new demands and need for development of salvage industry as well as investment. This applies on General Average as well as the act must be made possible also autonomously.

The legislative history envisages that the rules need to encourage to commit salvage and General average acts. The flexibility of the existing rules is clearly not enough for autonomous vessels. They

need revision or we need new rules just for autonomous vessels. The common core of the existing rules are the principles laid down by the Creeks and further developed by the Romans. This article uses some of the salvage and General Average situations to test, if the updating of legislation could be the solution. Will the old principles of law like Common Safety, Common Benefit or No Cure No Pay- principle and encouragement to Salvage Reward, be still applicable and useful as basis for the new legislation ?

Formation of Rules on Voluntary bases by the Market

What mechanism for updating or creating the new legislation would be suitable and fulfill the needs for safety and security for unmanned vessels? The Rules on General Average have been updated on a voluntary basis by the industry several times since 1864 and are expressed in carriage contracts as York-Antwerp Rules. The new version is YAR 2016, which still does not take into consideration of unmanned vessels. The writer of this article was a member of the International Working Group that developed the rules 2012-2016. The undersigned took up the problem with the unmanned vessels but the International Working Group considered it premature in its informal discussions still spring 2016.

Rewriting of Conventions or an Own Convention for autonomous seafaring ?

Updates to Salvage convention were considered last 2012 by CMI but they were then buried by the IWG. The unmanned vessels were not then discussed at all. Taking up the salvage law will be an issue in the future and it might be necessitated by the unmanned vessels and encouraged by the salvage industry was the topic already at table in the industry supported conferences later this year and IMO Legal Committee. The IMO Legal Committee will start to review the need for updating the conventions under its auspices and the IMO MSC Committee as well to satisfy the needs of future autonomous shipping in future. The future is here – whether we like it or not. Maritime law is ancient in the respect I have described. We need to consider, if it has any possibilities to survive with the rules of ancient origin, or does it need new thinking from another perspective.

REFERENCES

[1] R.R. Cornah and J. Reeder, LOWNDES AND RUDOLF, The Law of General Average and The York-Anterp Rules, 14th Edition, Thomson Reuters, 2014.

[2] Francis D. Rose, KENNEDY & ROSE: LAW OF SALVAGE, 9th Edition, Thomson Reuters, 2017.

THE EFFECT OF FLAG STATE WARNING LETTERS AS A MEANS OF ENFORCING IMO REC. 263 ON PILOTAGE IN THE DANISH STRAIGHTS

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Keywords: Pilotage, IMO Recommendation, UNCLOS, Innocent Passage, Flag state warnings

The intensity of heavy marine traffic entering and leaving the Baltic through the Danish Straights has steadily increased during the last decade.1 Since 2013, the number of vessels encompassed by IMO's recommendation to take a pilot in Danish waters has increased by 20% and yet the actual number of vessels taking a pilot in 2017 fell from 3282 to 27322.

IMO recommendation SN.1/Circ.263 Annex 8 states that certain ships should use for the passage the pilotage services locally established by the coastal States3. Vessels with a draught greater than 11m transiting the Great Belt, and loaded oil tankers with a draught of7 meters or more, loaded chemical tankers and gas carriers, irrespective of size, and ships carrying a shipment of irradiated nuclear fuel4, transiting the Sound are only recommended to take a pilot for their transit.

Due to long-standing international conventions5 still in force in Danish waters, any attempt to impose mandatory pilotage on vessels transiting these straights would be illegal. The UNCLOS Article 17 on Right to Innocent Passage and the Copenhagen Convention of 1857 Abolishing Tolls and Mandatory Pilotage in Danish waters thus allow ship operators to save considerable expenses by not taking a pilot.

Currently, a ship operator wishing to transit the Danish Straights faces two options. He may opt to adhere to IMO's recommendation to take a pilot and spend up to US $110006 each way, or he may instruct his master to navigate through these complex waters in heavy traffic and varying depths without a pilot, and face the consequences of being reported to his flag state by the Danish Maritime Authority. In principle, either choice is legal. This research discusses to what extent the use of Danish flag state warning letters issued to ships not adhering to IMO recommendation SN.1/Circ.263 has the desired effect, and whether shipowners experience any repercussions for failure to abide by what could be considered prudent seamanship.

This paper bases its research upon statistical data presented by the Danish Maritime Authority (DMA) combined with post-graduate research data generated via interviews of major stakeholders engaged in the maintenance of safe marine traffic through the Danish Straights. The Paris Memorandum of Understanding on Port State Control (Paris MoU) database (Thetis) was analyzed against flag state warning letters issued by the DMA to ships not adhering to the IMO recommendation SN.1/Circ.263 in 2017. The DMA data consists of statistical data on the name, nationality and type of ships transiting various stretches of Route T between 2013 and 2017. The DMA data analyses the interrelationship between nationality, owner, type of ship and contraventions to the IMO Recommendation. The purpose of this analysis was to ascertain whether the flag state letters had triggered an additional PSC inspection.

Preliminary results indicate that ship owners opting not to adhere to the IMO recommendation face no immediate legal or financial consequences whatsoever.

The question remaining to be answered is therefore: Is the risk being run by shipowners and charterers not taking a pilot through the Danish Straights counterbalanced by the overriding risk and consequences of a marine disaster.

REFERENCES

[1] Hansen, S. 2018.Pilotage Statistics by Danish Maritime Authority. [Online] January 2018. [Cited: March 23, 2018.] http://us.lodstilsyn.dk/514/statistics

[2] Jakob Wandel. Pilotageon shorter stretches. Danishseagoing officers trade union. [Online] 17 November 2017 [Cited: March 23, 2018.] https://soefartensledere.dk/2017/11/17/lodsliberalisering-lodses-paa-kortere-kortere-straekninger/

https://soefartensledere.dk/2017/11/17/lodsliberalisering-lodses-paa-kortere-kortere-straekninger/

[3] IMO Ref. T2-OSS/2.7 SN.1/Circ.26323 October 2007 Recommendation on navigation through the entrances to the Baltic Sea

[4] to IMO Recommendation SN.1/Circ.263 December 2003: Amendments to the recommendation on navigation through the entrances to the Baltic Sea

[5] UNCLOS Article 35 part C “Nothing in this part effects… the legal regime in straits in which passage is regulated in whole or in part by long-standing international conventions in force specifically relating to such straits.”

[6] DanPilot Rate Calculator. DanPilot. [Online] [Cited: May 14, 2018.] http://www.danpilot.dk/en/rate-calculator

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A COURSE PROPOSAL FOR THE TRAINING OF MARINE ENGINEERING STUDENTS ABOUT ALTERNATIVE FUELS, RELATED SYSTEMS, AND OPERATION

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Keywords: Alternative Fuel, Course Proposal, Engine Officer

Abstract. Sea trade is an important element of international trade. There are huge number of ships at worldwide, and they emit huge amount of emissions accordingly. Stricter emission regulations are entered into force, and will be entered into force in the future by the International Maritime Organization and EU to control and reduce these emissions. To comply with these regulations, alternative fuels are in use. The alternative fuelled ship number is in increase. Despite the alternative fuel usage at maritime industry increases, there are not any alternative fuel courses at the maritime universities to educate the marine engineering students. In this study, a new course about the alternative fuels, their related systems, and operation is proposed for the training of the marine engineering students. Competences at the STCW amendments for the persons who work on alternative fuelled ships are taken into account while preparing the course topics. Each topic is paired with basic and advanced training competences of the STCW amendments, and compliance with the STCW is provided. Lastly, the course topics and sub-topics are explained for the guidance to prepare the alternative fuel course.

1 INTRODUCTION

Sea trade forms the major part of international trade. It is done with 93.161 merchant ships in various size and tonnages [1]. This high number of ships mean huge amount of fuel consumption and emission formation related to the fuel consumption. According to International Maritime Organization (IMO), global annual fuel consumption from all ships was 300 million tons [2]. Again, IMO stated that the shipboard NO_X emission was 19 million tons, the SO_X emission was 10.2 million tons, the CO_2 emission was 949 million tons, the CO emission was 936 thousand tons, and the PM emission was 1.4 million tons in 2012. The emission amounts enforce IMO and local authorities to make emission rules and regulations more stringent. Lower NO_X emission limits, less sulphur in fuel, and new CO_2 emission control and reduction strategies like MRV Regulation or IMO Data Collection System are measures to prevent higher emission amounts.

To cope with the stringent emission rules and regulations, ship owners and operators have to use emission abatement technologies or alternative fuels at their ships. Usage of the alternative fuels on ships increases in number. Liquefied natural gas (LNG), liquefied petroleum gas (LPG), and methanol is in lead at the use of the alternative fuels on ships. There are 116 LNG fuelled ships, 12 LPG fuelled ships, and 2 methanol fuelled ships in operation [3]. Alternative fuelled fleet will increase with new buildings.

IMO pays attention to the progress at the alternative fuel usage at maritime industry. In this framework, The Code of Safety Using Gases or Other Low-Flashpoint Fuels (IGF Code) was adopted, and entered into force on and after 1 January 2017 [4]. By this code, some amendments were made to Chapter II-1 and Chapter II-2 of the International Convention for the Safety of Life at Sea (SOLAS) which were also entered into force on and after 1 January 2017 [5]. Other important amendments were made to the International Convention on Standards of Training, Certification and Watch keeping for Seafarers, 1978 (STCW), and entered into force on same date with other relevant conventions.

Nowadays, education about the alternative fuels increases its importance. There are some examples for the courses in worldwide for land-based facilities and vehicles. Veer Surendra Sai University of Technology has the course named Internal Combustion Engine & Gas Turbines which includes the alternative fuels in its course plan [6]. Another course is the "Alternative Fuel" which is given at The Hong Kong Polytechnic University [7]. Maritime based alternative fuel courses are in few numbers. There is a postgraduate program at World Maritime University (WMU), which includes the alternative fuels & renewable energy [8], but this is also not a course that contains whole aspects of the STCW. Aboa Mare Maritime Training Center has IGF Code course, which complies with the requirements laid down in the STCW [9]. This five day course gives basics about required training by the IGF Code, but more intensive course program should be given at the maritime universities.

Recent developments in both technology and legislation bring necessity of education of the ratings and especially the officers about the alternative fuels, shipboard alternative fuel systems, and operation. Maritime universities have important place in officer training, and should adapt themselves to the developments in the maritime industry. This study aims to propose a new course to give adequate knowledge to the marine engineering students about the alternative fuels, fuel systems, and the operation with the alternative fuels. For this purpose, competences part of the basic and advanced training of STCW amendments is taken as a reference. Knowledge, understanding and proficiency part related to the competences are examined in detail. A course syllabus is formed, and the course topics are explained.

2 STCW AMENDMENTS RELATED TO THE ALTERNATIVE FUELLED SHIPS

STCW has the amendments to the Chapter VI – Special training requirements for personnel on certain types of ship. New section, A-V/3 – Mandatory minimum requirements for the training and qualification of masters, officers, ratings and other personnel on ships subject to the IGF Code was added. The amendments include the basic and advanced training and qualification requirements for the ratings and the officers [10]. Table 1 shows the competences of the basic and advanced training. The basic training is for ratings, and the basic and advanced training is for officers.

"BUT WHAT'S THIS LONG FACE ABOUT, MR. STARBUCK; WILL YOU NOT CHASE THE WHITE WHALE?" A GAP ANALYSIS TO DETERMINE ADULT EDUCATION LEARNING STYLES IN INSTRUCTIONAL TRAINING FOR MARINERS VIA ONLINE LEARNING

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Keywords: postsecondary instruction; online education; training for seafarers; andragogy.

ABSTRACT

The IMO's model course 6.09, Training Course for Instructors, 2017 edition, provides the framework and standards for instructing marine professionals to teach succeeding marine generations at the post-secondary level. Certainly, both new and seasoned maritime instructors benefit from instructional standards, which both enhance maritime education's overall standardization and enrich the learning mariner's educational experience. The IMO's model course is designed to promote validity and reliability of curricula to enhance standardization of instructional delivery. Given the need for reliable, valid instruction in this area, coupled with the emphasis on validity and reliability in educational discourse, this paper first overviews the Marine Institute's framework for such a course, and second, conducts a gap analysis between the IMO's curricula and current adult learning theories to determine which styles may enhance maritime instructors abilities to motivate and appeal to adult learners. The Marine Institute's postsecondary instruction for maritime professionals course will be offered in a distance delivery format to promote accessibility and flexibility for maritime candidates. The nuance in the potential successful delivery of such a course is promoting the fostering of adult learning styles, which can be challenging when offered in an online venue. As adult learning theory and the IMO model course point out, motivation is a key contributor to successful learning. Adult learning styles are best cultivated and intrinsically linked to motivation through experiential, transformative, and self- reflective modalities. A gap analysis between IMO's model course and the aforementioned methods is provided to best determine criteria to include in the Marine Institute's offering of this IMO-inspired course to best suit the needs of its maritime instructors. The gap analysis is complemented with a collaborative dialogue segment for IAMU attendees to better assess and gather feedback for the potentialities for increasing these andragogical methods in training mariners to instruct at the post-secondary level.

ANALYZING STUDENT FEEDBACK FROM THE 2017 IAMU STUDENT FORUM: CHARTING PATHS TO THE FUTURE

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Keywords: MET, student forum, feedback analysis

2017 IAMU STUDENT FORUM

The 2017 IAMU Student Forum, jointly organized by IAMU and IMO, was held at the IMO Headquarters in London, England from July 11-13. The student forum was a global event in every sense: 59 students from 52 IAMU member universities, hailing from 30 different countries participated in the event, making it a truly international and multicultural experience for everyone involved. During the student forum, participants had the opportunity to connect and collaborate with world-leading researchers, educators, and experts from the maritime industry while under the auspices of the IMO.

The IAMU Student Forum was held in conjunction with IMO's World Maritime Day 2017, which theme was "Connecting ships, ports, and people." This theme was chosen to highlight the vast and diverse components of the maritime industry, and the forum workshops were designed to mirror this concept using a student-centered methodology. The workshop part of the forum consisted of 5 different groups, each assigned with the difficult task of addressing complex issues currently facing the maritime industry. The 5 workshop topics were the “Attraction, retention, and attrition of seafarers,” “Global maritime professionals,” “Ports and shore-based business,” “Quality training on board for the first license,” and “Gender in the maritime industry.” Over the course of the forum, students worked under the supervision of their facilitators and co-facilitators to identify the underlying issues at the heart of each topic, while also coming up with unique suggestions and solutions for dealing with them.

Analyzing Student Feedback

One of the main goals of the 2017 IAMU Student Forum was to engage the student participants in a learner-centric approach that would encourage them to work interdependently on well-defined learning tasks. Each participant was responsible for their own performance, verbalizing their ideas, conducting their work, while the group facilitators guided the group-learning process, interacting with students in a personal, dialogic fashion rather than being overly directive or authoritative [1]. The group facilitators were not to focus on overt instruction, but rather on clarifying topic expectations, catalyzing dialogue, circulating actively among the groups, reinforcing positive instances of cooperative behavior, issuing timely questions designed to promote elaboration and encourage higher-order thinking [2].

Another goal of the 2017 IAMU Student Forum was to overcome the serious disadvantages of traditional teacher-centric education, by encouraging students to actively find links between theory and practice. Group work plays an important role in the development and maturity of personality while it is a momentous factor in the process of socialization [3]. This student-centric learning approach was built around the workshop topics and discussion results as the students tried to understand not only the topics themselves, but also their underlying concepts and mechanisms. Participants in the forum not only acquired the necessary understanding of the designated topics, but also developed generic competencies such as communication skills, problem solving, and team work spirit, which are the hallmarks of task-based learning methodology [4].

This paper summarizes the workshop outcomes of the 2017 IAMU Student Forum, and analyzes the post-workshop feedback that was collected from the student participants. While the student feedback was overwhelmingly positive for the event, indicating high levels of learning and knowledge gains, encouraging rates of participant satisfaction, and demonstrating signs of successful networking between the participants, there is still much to be learned from the general survey feedback and specific participant comments that will help guide future activities to be even more successful.

REFERENCES

[1] Cuseo, J. "Cooperative learning vs. small-group discussions and group projects: The critical differences." *Cooperative learning and college teaching* 2.3 (1992): 5-10.
[2] Leki, I. "“A narrow thinking system”: Nonnative-English-speaking students in group projects across the curriculum." *TESOL quarterly* 35.1 (2001): 39-67.
[3] Gatfield, T. "Examining student satisfaction with group projects and peer assessment." *Assessment & Evaluation in Higher Education* 24.4 (1999): 365-377.
[4] Harden, R. M., et al. "Task-based learning: the answer to integration and problem-based learning in the clinical years." *Medical Education-Oxford* 34.5 (2000): 391-397.

THE CASE-STUDIES BASED APPROACH IN MARITIME ENGLISH TEACHING

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Keywords: case study, maritime English, competence, approach

1 INTRODUCTION

The English language competence is progressively becoming a mandatory requirement for all ranks of seafarers. The conventions, developed by the International maritime Organization, clearly require the application of English in marine activities. The convention regulating Safety of Life at Sea requires that the English language shall be applied on the navigation bridge to provide safety communication. [2] The Convention on Standards of Training, Certification and Watchkeeping for Seafarers shows the range of the English language competency requiring the officers in charge of navigational watch to use printed and electronic nautical charts, necessary nautical publications, including meteorological data and the information related with vessels' safety, security and operation, and to implement other obligations of the officer including application of the IMO Standard Marine Communication Phrases. [3] Therefore, the provision of outcomes-aimed teaching of Maritime English needs application of different approaches intended to develop above stated competence. Thus, the aim of the paper is to offer the ways, providing the cadets with appropriate language competence.

2 The Hypertext-Based Approach in Maritime English Teaching

In our opinion (based on application of the below stated approach at BSMA), one of the useful methods to satisfy the needs presented above is to involve the practice of a hypertext into Maritime English teaching. Hypertext provides possibility of the whole text listening, listening and reading of translation of (preliminarily chosen) key words, pictorial illustration of marine terminology, usage of the picture as the knowledge development source – clicking the unknown part of a ship the student is immediately provided with the term's pronunciation and translation (a picture in Maritime English is really worth a thousand words and explanations). Hypertext also provides self-control and self-assessment options having a dual educational outcome – as the academic activity, as well as the factor increasing individual responsibility of the student. Distinctly from the analogue text, essence of the hypertext ensures constant development of its components in reply to course of studies demands.

3 The Case Study Based Approach in Maritime English Teaching

Therefore, in case of development of students' competence of technical marine terminology acquisition, it is sufficiently to use application of hypertext advantages. At the same time, it is also significant to consider the officers' obligations foreseen by the IMO model course "Leadership and Teamwork", implementation of which is directly interrelated with the increasing role of Maritime English. Thus, the officers' competence also includes implementation of operative safety management via on board and shore-based communication. [4] In our opinion, one of the most effective ways to ensure the students with appropriate competence is to choose the teaching data, causing the students' interest and accordingly making teaching successful in results. Thus, one of the best ways to cause the future seafarers' interest is to provide them with the compilation of Presentation, Practice, Production (PPP) method involving real marine cases showing actual features of life and work aboard. Consequently, the paper offers a model of PPP lesson based on a real case study, aimed at provision of appropriate communication competence in case of such critically important issues, such as: contact,

collision, capsizing, sinking, flooding and listing, fire, explosion and grounding (the frames of the paper do no give possibility to put the whole set of intended material, that is why we offer only one brief scheme of the intended proposal).

3.1 Presentation, Practice, Production (PPP)/Case Study Arranged Lesson Sample

Thus, if our aim is to build up the lesson using the real case study, all the components (Presentation, Practice, Production) of the lesson are presented with examples of the real accident which took place at sea on board the merchant fleet. So, we offer to start the PPP/case study-arranged lesson with the warmer, presented by the real pictures, involving the students into discussion predicting what happened with these two vessels. Then, as the review tool, the students are asked to define (in the frames of preliminarily provided material) the role and importance of the message markers of the IMO Standard Marine Communication Phrases in provision of effective and safe maritime communication. As the next step of the lesson implementation, the students are given the hand-outs containing the brief summary of the real accident. As the next stage of PPP implementation, the students are elicited to suggest the possible reasons of the accident - listening part of the lesson introduces the transcript of the noted collision, indicating time, party and communication. As the final production part of the lesson, the students are offered to make Presentation though the Role Play: using the given components, they should put necessary corrections into the above mentioned VTS-MV/MV-VTS communication and avoid collision.

Conclusion

Thus, modern maritime education and training is shifting from traditional model into a wide range one, in which the creative approach is of principal importance. Thus, hypertext and case study can play a significant role in reshaping the traditional English language resources to respond to modern maritime education needs, decreasing the gaps that exist between maritime needs and the outputs of education system. The application of the above mentioned approaches in Maritime English teaching can raise access to learning opportunities. It can help to improve the quality of education with advanced teaching methods, progress learning outcomes and enable better planning of unlimitedly flexible educational programs.

REFERENCES

[1] ISM Code with Guidelines for its Implementation, London, IMO, 2014

[2] The International Convention for the Safety of Life at Sea (SOLAS) Consolidated Edition, London, IMO, 2014

[3] The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), London, IMO, 2011

[4] Model Course 1.39 Leadership & Teamwork, London, IMO, 2014

[5] MA2011-6, MARINE ACCIDENT INVESTIGATION REPORT, Japan Transport Safety Board, 2011 [online]. [viewed date 10 May 2018]. Available from: http://www.mlit.go.jp/jtsb/eng-mar_report/2011/2009tk0009e.pdf

[6] SMCP with pronunciation guide, London, IMO, 2002

[7] Z. Bezhanovi, An Interactive Course in Maritime English, Batumi, 2010

CHALLENGES IN MARINE ENGINEERS TRAINING. GOALS AND OPPORTUNITIES IN THE ACADEMIC EDUCATION ON ELECTRIC MARINE TECHNOLOGY

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Keywords: Training, education, marine engineers, FNB, STCW, impact of technology, super-yachts, generation offshore, electrical systems, high voltage (HV), power quality, control, regulation, automation, maintenance, smart grids, big data and simulation.

Thematic area: Impact of new technologies in maritime education

Abstract submission: The authors propose this abstract to be selected for the conference proceedings

ABSTRACT

The design and operation of merchant ship systems every day is more specialized and complex due to the continuous technological advances. The increase of the automatic systems of supervision, analysis and regulation of the different operations or services on board, is based on the use of computer applications that centralize and optimize decision making, among which can be indicated, without being exhaustive, the ship positioning control (DP), energy management with the consequent improvement of performance and emission reduction, safety, comfort on board, reduction of equipment maintenance costs, etc. All those have implied an important reduction or elimination of manual operations, traditional on engineering practice, and with the least possible number of crew members.

The changes that are taking place in the maritime industry also affect sub-sectors (clusters) or new business forms in the maritime world, where Europe has a dominant position. European yacht builders produce 60% of the mega yachts [1], Europeans dominate the emerging market for offshore renewable energy [1]. Catalonia, and especially Barcelona, can achieve a prominent position, providing qualified engineers and high added value maintenance and repair services to the superyacht subsector.

This requires, increasingly, to have specialists, on board and on land, who are able to operate, manage or inspect the vital services of a ship and the systems that compose them, such as:

- Electric Power Plant (including HV generation)
- Electric Propulsion (Azipods, including HV electric machines)
- Distribution network and protections (including HV grids)
- Supervision and installation of sensors (temperature, pressure, level, movement, vibration, consumption, etc.)
- Programming of PLC's for data collection, control and command operations.
- Programming of converters and frequency inverters, for the optimal management of starting and operation of electric motors.
- Communication networks between computer equipment
- Radio / Radar Communication Engineering

All these services, managed as a set, under concepts such as Smart Grids [2 to 4], Big Data (Voyage data recorders VDR, for emission control based on energy efficiency) [5 to 7], as well should be integrated among of academic knowledge.

The paper presents how the current curriculum of degrees and master's degrees of the Barcelona School of Nautical Studies (FNB - UPC), have incorporated the new requirements for the certification of watchkeeping engineers, chief engineer officers and second engineer officers, in the part related to the function “Electrical, electronic and control engineering”, provided in the Manila amendments to the part A of the STCW Code [5] and the consequences for maritime education and training resulting from them. The syllabus established in the IMO model course for the ETO officer will be a basic reference in the development of the contents of Undergraduate and Master studies.

The current curriculum to had absorb not only the STCW requirements, but also improve academic qualities and qualifications for marine engineers in order to provide flexibility in employment opportunities and give them the real competency to face the challenges of the future.

The paper also proposes new contents that should be incorporated, to keep the programs updated with respect to technological advances.

REFERENCES

[1] European Commission. Directorate-General for Maritime Affairs and Fisheries. The role of Maritime Clusters to enhance the strength and development in European maritime sectors. Executive Summary. 2009. ISBN 978-92-79-11559-2

[2] Fotis D. Kanellos; George J. Tsekouras; John Prousalidis. Onboard DC grid employing smart grid technology: challenges, state of the art and future prospects. IET Electrical Systems in Transportation. Year: 2015, Volume: 5, Issue: 1, Pages: 1 – 11. DOI: 10.1049/iet-est.2013.0056

[3] Shantha Gamini Jayasinghe [1*], Lasantha Meegahapola [2], Nuwantha Fernando [2], Zheming Jin [3] and Josep M. Guerrero [3]. Review of Ship Microgrids: System Architectures, Storage Technologies and Power Quality Aspects. Inventions 2017, 2, 4; pages: 3-19. DOI:10.3390/inventions2010004, www.mdpi.com/journal/inventions

[4] Rolls-Royce Marine, Mikael Mäkinen, President. Autonomous ships. The next step. [on line]. 2016. [Query: 11 of march 2018]. Available in: http://www.rolls-royce.com/~/media/Files/R/Rolls-Royce/documents/customers/marine/ship-intel/rr-ship-intel-aawa-8pg.pdf

[5] Lokukaluge Prasad Perera. Maritime Big Data. MARINTEK – Norwegian Marine Technology Research Institute. 2016. DOI: 10.13140/RG.2.1.4839.9761

[6] IMO. Guidelines on Voyage Data Recorder (VDR). Ownership and recovery. [on line]. May 2002. [Query: 11 of march 2018]. Available in: http://www.imo.org/en/OurWork/Safety/Navigation/Documents/1024.pdf

[7] Big Data in the marine sector. [on line]. April 2017. [Query: 11 of march 2018]. Available in: http://www.maritimejournal.com/news101/onboard-systems/monitoringand-control/big-data-in-the-marine-sector

[8] IMO. Adoption of the final act and any instruments, resolutions and recommendations. Resulting from the work of the conference. Attachment 2 to the Final Act of the Conference. Resolution 2 The Manila Amendments to the Seafarers’ Training, Certification and Watchkeeping (STCW - 78) Code. August 2010

COMPARING NAUTICAL BSC-PROGRAMS AND THEIR QUALITY INDICATORS

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Keywords: Nautical, BSc-programs, quality indicators, comparison, program measurement

ABSTRACT

Nautical BSc programs must address the standards of competence and the KUP's identified in the STCW-code. How this is practically adopted, and how this is incorporated into the program may vary as this is left to the institution itself. Our study seek to investigate the different ways of conducting a nautical BSc program and to explore and compare the different ways of program management, by using the same set of quality indicators worldwide.

We conducted a comparison between 12 institutions providing nautical education, 11 with BSc-degrees in nautical sciences. The general problem when evaluating universities and colleges is to define and identify the institutional contribution to each candidate's competencies, skills and knowledge. First rate students, including candidates intellectually above average may learn whether they are enrolled in an institution with top learning environment, state of the art facilities and the most excellent teachers and professors, or not. Vice versa, the top institutions with regard to learning may lift under-average students up to a level where they achieve the needed competencies, skills and knowledge in order to perform well within a profession [1].

The need to measure institutional performance is a direct consequence of international competition as indicated above, and it gives information and may build trust; to the applicants and future candidates and their employers, to the funding governments / and or donators and also to the staff.

When developing quality indicators in order to contribute to such information these should [2] firstly give precise and easily understandable information with respect to which degree goals are met. Secondly, define and identify the institutional contribution with regard to achieving the goals, and finally exclude the various stakeholders (In particular the institutions, students and teaching staff) from the ability to manipulate the information given.

The quality indicators chosen were the European Credit Transfer and Accumulation System (ECTS) and equivalent for the non-European universities, as an instrument for comparison [3]. Then the entry criteria, retention- and failure rate, the structure and content of the nautical study program in relation to STCW related subjects, nautical/maritime subjects beyond the STCW requirements and complementary subjects e.g. science subjects.

Simulators and laboratories. Research within the field provides a wide range of evidences regarding the usefulness and effectiveness of simulator education/training [4].

The academic/teaching staff with operational competencies such as Certificates of Competence (CoC), academic competencies such as MSc and PhD combined with titles as professor, associate or lecturer. The combination of operational and academic competencies is of particular interest. We identify the proportion of staff members with the highest level of professional standard (Master Mariner) combined with the highest academic standard (e.g. MSc or PhD) [5].

Relevant research activities. When teaching complex theoretical subjects, it is a quality indicator that the institution's own teaching staff do carry out relevant research themselves.

Final projects or bachelor thesis. Industrialized countries typically include academic learning goals for their BSc. nautical study programs. I.e. the curriculum not only contains subjects but also a final project or thesis.

Given our set of quality indicators, we have four important observations. Firstly, that our informants, all from industrialized nations with nautical education in the form of BSc-programs, do prefer to integrate on board training / the cadet period through 4-year BSc programs leading to Certificate of Competence (CoC). This stands in contrast to one nation in particular with a 3-year model without CoC.

Secondly, that robustness is not a clear concept. Some institutions are clearly more robust with regard to both formal competencies as researchers and practical competencies with CoCs at management level. This in turn may indicate a stronger and improved ability to give candidates a learning environment with regular institutional contribution.

Thirdly, the volume of simulator training varies, and the one nation with its 3 year BSc-model has a rather high volume of such training. This leading to a question for further research; may one substitute the 12 month cadet period with increased focus on simulator training?

Fourthly, we did not find a clear causal connection between the nautical students' level of proficiency and a demand for particular subjects beyond general high school fulfilment as an entry requirement. However, other studies [6] clearly indicate that a higher intake level gives better performance through the program, thus a higher intake level give a potential for improved learning goals. We discuss if there are subjects in high school of particular importance for future navigators / BSc-programs leading to CoC, i.e. math, physics, chemistry, English.

In an era with fast development of technology that will have an impact on ship operations, i.e. increased demands for efficiency end environmental friendly ships, through reduced levels of emissions and autonomous ships, we discuss the need for continuous development of the nautical education and its future role with respect to safety and security.

[1] Centre for Economic Research at NTNU; SØF-rapport 01/16
[2] Norwegian research with further references; Centre for Economic Research at NTNU; SØF-rapport 05/16(p.1)
[3] Cfr. https://ec.europa.eu/education/resources/european-credit-transfer-accumulation-system_en
[4] Kluge, A., Sauer, J., Schuler, K., & Burkolter, D. (2008). Designing training for process control simulators: a review of empirical findings and current practices, Hiebert, N. M., Vo, A., Hampshire, A., Owen, A. M., Seergobin, K. N., & MacDonald, P. A. (2014). Striatum in stimulus–response learning via feedback and in decision making. NeuroImage, 101, 448-457
[5] FOR-2017-02-07-137 Studietilsynsforskriften. FOR-2011-12-22-1523 Forskrift om kvalifikasjoner m.v.
[6] Norwegian research with further references; Centre for Economic Research at NTNU; SØF-rapport 05/16.

DEVELOPMENT OF MARITIME EDUCATION AND TRAINING THROUGH HUMAN-WARE UPGRADING

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Key Words: Education, Empowerment, Intellectual, Cognitive, Intelligence, STCW Convention.

Abstract: The need for a new approach in Maritime Education and training (MET) has become essential, competency based training and formal education does not have the same effect on seafarers as it did ten years ago. The vast development in technology and new discoveries in neuroscience are introducing new tracks through which MET systems could be upgraded and enhanced. Considering the mental health of seafarers and developing their cognitive and intellectual capabilities through education, parallel to the application of new lifestyle choices, could upgrade seafarer's mental capacities and intelligence, to be much more efficient in acquiring, memorizing & recalling knowledge, and thus better enable them to take proper decisions to reduce the potential of human error.

1 INTRODUCTION

Statistics of marine accidents trends have shown a decrease in accident rates during the past five years. Mostly, results of accident investigations and researches have declared that human errors have the responsibility of more than 85% of the causes behind marine accidents. Despite the International Maritime Organization's predominant role in the development and amendment of its instrument's to reduce and control that problem. Yet, the human element is still making mistakes that inherently, have the potential to lead to more accidents.

Quoting Einstein, *"We cannot solve our problems with the same thinking we used when we created them"*. **[1].** The solution cannot be applying the same remedy if the result is not changing; it is time to try a new prospective, or at least approach from a different angle of thought. To enhance marine officer's performance and efficiency, their cognitive and intellectual capabilities have to reach a certain level of intelligence and must be cognitively assessed periodically, empowered & made to benefit from the wealth of knowledge & experience that has become available through technology, modern day communication and new researches in neuroscience.

While Humanware is defined in IT as "*hardware or software that is built around user capabilities and user needs. This often involves creating a particular visual or physical interface for a given set of users*"**[23]**. However, for the purpose of this

paper, Humanware means "the Mental capabilities of workers especially those working in difficult occupation like seafarers: that could be upgraded or reshaped through education and training to be much more efficient to perform certain tasks properly or increase the cognitive abilities to ensure efficient mental functioning and response. The adaptation of Humanware will be through its internal software (brain plasticity and external software (brain training).

Equally important, mental health is "*the result of the interaction between biological, psychological and social factors and increasing evidence point to work related factors that play a key role in the development of mental health issues in the workplace"* **[7]**. According to the World Health Organization, key factors include workload, lack of control, monotonous work tasks, role ambiguity, conflict, poor interpersonal relationships, poor working conditions, and inequity **[7]**.

Mental ability represents a person's "brain power" in different aspects of competency, including verbal, mathematical, spatial, and logical reasoning, which is one of the most important components of functional abilities for a worker. **[5]**

2 MENTAL HEALTH OF SEAFARERS

Seafaring is a high-risk occupation with a unique working environment from the physical and psychosocial point of view. Ships' crews are facing different challenges that acutely influence their mental health and behavior which include; solitude, dangerous settings, poor working conditions, lengthy periods away from home and family, limited options & free time, poor work relations, lack of shore leaves, intercultural differences and job insecurity, all which have been linked to stress, anxiety, fatigue, depression, alcohol and substance abuse and poor mental health **[15].**

In addition seafarers are facing latent difficulties in the surrounding working environment they live in for prolonged periods of time such as noise, vibration, temperature changes, electro-magnetic fields and isolation, all of which can be directly related to dangers such as accidents, injuries and diseases **[8]**.

This working environment with its many psychological & physiological variants incorporates many health problems, including suicide, depression, anxiety, alcohol or drug dependence. Psychological health also relates very strongly to many life-style associated health problems found in the other thematic categories; such as cardiovascular disease, diabetes and sexually transmitted disease **[16]**.

Mental sub-health is one of a series of sub-health status, and mainly implies unexplained mental fatigue. The mental sub-health warning mood includes disorders, panic, anxiety, low self-esteem, nervous, reckless, even suicidal thoughts. Seafarers' mental health status seriously affects the efficiency and the success or failure of their jobs. Such poor mental or psychological state makes them prone to accidents **[27]**.

Psychiatric illness is associated with several specific areas of impairment that may be relevant to work at sea like: impaired information processing ability: attention/concentration, vigilance impaired, visual-spatial functioning with increased latency of motor responses, poor impulse control, including increased risk taking,

EDUCATING THE FUTURE MARITIME WORKFORCE IN A SEA OF CONSTANT DISRUPTERS AND CHANGE

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Keywords: IAMU 2018, maritime education, maritime training, maritime colleges, maritime academies

Abstract. This paper considers how technological change, and the rate of that change, will impact maritime education and training and our graduates. Changes in technology, the environment, the regulatory picture and globalization represent a more complex array of forces for our students to understand than ever before. Students can no longer assume that acquired technical skills will serve the demands of their rapidly changing workplaces. These changes and challenges require maritime universities to elevate our academic programs, ensure our curricula remain relevant, and provide our students with tools and adaptive skill sets they will need to become life-long learners. This will require maritime universities to conduct an "environmental scan" of the world and environments in which they operate, and interpret relevant external factors and trends. As an example, the author provides a scan of the maritime industry, its impact on maritime education and training programs, and recommendations on how maritime universities can adapt in an age of "accelerated change."

ENHANCED FAST-TIME-SIMULATION FEATURES TO SUPPORT SHIP-HANDLING SIMULATOR TRAINING

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Keywords: Simulation, ship handling, training, voyage planning, optimising manoeuvring concepts

POTENTIAL OF FAST TIME SIMULATION (FTS) FOR TEACHING AND LEARNING IN THE MARITIME TRAINING ENVIRONMENT

New technologies as Fast Time Simulation (FTS) have great potential for teaching and learning in the maritime training environment and for use on board of ships. New concepts for training application of these innovative technologies were developed at Maritime Simulation Centre Warnemuende MSCW in research projects. The innovation is to simulate the ships motion with complex dynamic models in fast time and to display the ships track immediately for the intended or actual rudder or engine manoeuvre, steered by a smart interface. These simulations allow for new type of manoeuvring design and optimisation at every Manoeuvring Point MP, not only for the next manoeuvring segment ahead but also for the following or even for series of manoeuvring segments. One obvious basic advantage in relation to conventional ship-handling training and navigators' preparation of harbour approaches is the easy creation, visualization and comparability of different manoeuvring strategies.

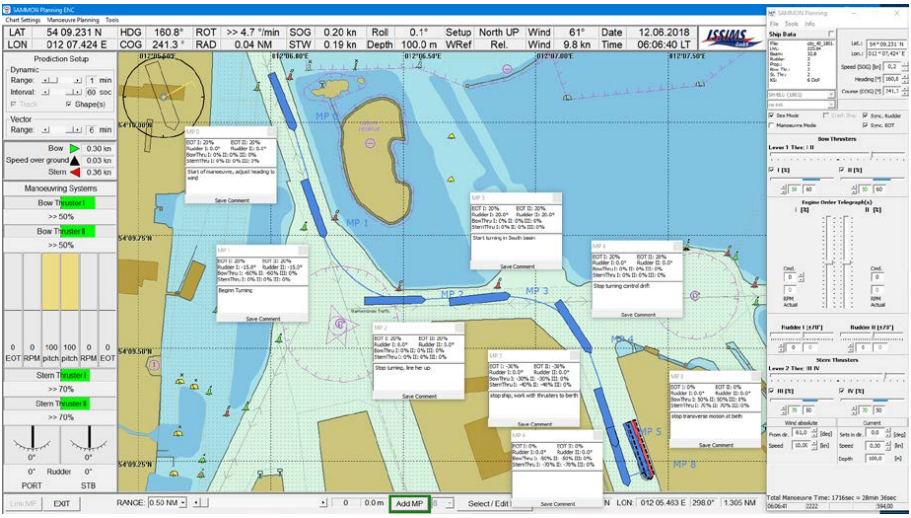

Figure 1: Complete Manoeuvring Plan from FTS Planning Module for Cruise ship for arrival at Rostock Port. The track is indicated by blue lines and Manoeuvring Points MP as ship shapes, additional manoeuvring point information text boxes show the control settingsfor breifing

Technological setup and presentation of results

The FTS software system consists of various modules for (a) Manoeuvring Design & Planning, (b) Monitoring & Conning based on Multiple Dynamic Prediction, (c) Trial & Training and (d) Replay and Assessment. Specifically the Planning module is the missing link in Voyage planning because it allows to develop the concept of specifically the manoeuvres in the unsteady motion segment after entering the moles up to the final berthing manoeuvre – and even to try out alternatives and limits of environmental effects. For practical application the new FTS-features were interfaced to the new Full-Mission and Desktop ship handling simulator systems, configured by benntec / Marinesoft, based on Rheinmetall RME bridge simulator software.

Fig. 1 ANS 6000 brige simulator with Fast Time Simulation System for Simulation-Augmented Manoeuvring Design, Monitoring & Conning - SAMMON is fully integrated to the ANS 6000 by a smart interface using LAN and WLAN. Left: Bridge simulator overview with SAMMON Planning station (right) and instructor station (left) in the foreground, manoeuvring console with displays and visual system in the background. Right: Manoeuvring console with handles and screens with SAMMON Monitoring & Conning Tool display with multiple prediction on the left side

Application of the method and samples of use

It became obvious that the new FTS technology has great potential for teaching and learning in the maritime education, both for lecturing and for simulator training in briefing and debriefing sessions of exercises. Experiences have been made how this new technology can be used to improve the simulator training in the Advanced Ship Handling Training course

- at the World Maritime University, Malmoe / Sweden,
- at the Maritime Simulation Centre of AIDA Cruises at Rostock /Germany and
- at the CSMART Center for Simulator Maritime Training of Carnival corporation at Almere /NL

Samples of application for briefing / debriefing and introduction lectures for simulator exercises specifically for typical cruises ships with Twin-Screw and -Rudder systems will be shown in the paper and at the conference. The potential of this technology for advanced maritime education and training will be discussed.

REFERENCES

[1] Baldauf, M.; Benedict, K. (2018) Innovative Fast Time Simulation for Training. *SEAWAYS – The International Journal of the Nautical Institute*, March 2018, , pp. 6-11

[1] Benedict, K.; Baldauf, M.; Fischer, S.; Gluch, M.; Kirchhoff, M.; Schaub, M.; KrÜger, C-P.; Klaes, S. (2016), Simulation technology brings new visualisation of the future ships path – and advanced use of the well-known speed vector, 24th Int. Maritime Lecturers Assoc. Conf., Galveston USA

[2] Website Innovative Ship Simulation and Maritime Systems GmbH (ISSIMS GmbH; www.issims-gmbh.com).

FACTORS THAT AFFECT THE DELAYED EMBARKATION FOR AND RETURN FROM SHIPBOARD TRAINING OF MAAP CADETS

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Keywords: Shipboard training, delay, factors, MAAP.

ABSTRACT

The general aim of the study was to identify the factors that affected the delayed embarkation for and return from Shipboard Training of cadets from the Maritime Academy of Asia and the Pacific (MAAP). In this paper, the researchers set three different phases of Shipboard Training, namely: 1. Pre-Shipboard Training, 2. Shipboard Training, and 3. Post-Shipboard Training, to categorize the factors of delay and to determine the extent of delay which these factors generated. The research involved fourth year cadets who came back from a one-year Shipboard Training, set during their third year of study. Using a validated survey form and by implementing one-on-one interview with every respondent, the researchers were able to collect data needed for the completion of this paper. Of all the factors in the first and second phases, Shipboard Training Contract and Vessel Assignment appeared to be the most dominant factors that caused the delay of MAAP Cadets. The said factors of the delay were most evident during the Pre-Shipboard Training phase. From the 80 respondents, the majority of respondents (48 of 80) were affected during the Pre-Shipboard Training phase by either In-House Trainings, Vessel Assignment, Company Requirements or any combination of these three. During the Shipboard Training phase, the majority of the respondents (54 of 80) were affected by Contract and Vessel Assignment. For the Post-Shipboard Training phase, 37 out of 80 were delayed due to Enrollment. The Pre-Shipboard Training phase proved to affect Cadets the most in terms of the duration of the delay. It had a median value of four months, as compared to the median value of one month for both Shipboard Training and Post-Shipboard Training phases. With these results, the researchers recommended that Shipping Companies, Manning Agencies, and the Academy should organize studies to improve the forecasting of Cadet demand vis-à-vis vessel availability. Furthermore, close coordination with the Academy's Department of Shipboard Training and Shipping Companies / Manning Agencies should include projecting Cadet's training schedule, embarkation, vessel transfer, disembarkation, and overall Shipboard Training duration. As part of the Pre-Shipboard Orientation, the Academy should cascade the results of this research to the MAAP cadets who are going on Shipboard Training so that they are made aware of the existence and extent of these factors that cause delay..

REFERENCES

[1] CHED. Commission on Higher Education [online]. Manila: CHED, 2017. CMO No. 67 s.2017 Revised Policies, Standards and Guidelines for the Bachelor of Science in Marine

Transportation (BSMT) and Bachelor of Science in Marine Engineering (BSMarE) Programs. [viewed date 30 November 2017] Available from http://web.ched.gov.ph/cmo-67-s-2017-2/-43

[2] CHED. Commission on Higher Education [online]. Manila: CHED, 2017. CMO No. 70 s.2017- Revised Policies, Standards and Guidelines for the Bachelor of Science in Marine Transportation (BSMT) and Bachelor of Science in Marine Engineering (BSMarE) Programs. [viewed date 30 November 2017] Available from: <http://web.ched.gov.ph/cmo-70-s-2017-2/>

[3] Singh, M. Marine Insight [online]. 5 Problems Affecting Seafarers Today. [viewed date 12 January 2018] Available from: <https://www.marineinsight.com/life-at-sea/5problems-affecting-seafarerstoday/>

[4] Dizon and Vergara. Studymode [online]. Determinants of the Delayed Shipboard Embarkation of MAAP Class 2010-2013 cadets. [viewed date 12 January 2018] Available from: <https://www.studymode.com/login.php?redirectUrl=%2Fessays%2FDeterminantsOf-Delayed-Shipboard-Training-1484338.html&from=essay>

[5] Genutė Kalvaitienė and Viktoras Senčila. OAJI. Open Academic Journal Index [online]. Maritime Students' Professional Career Planning Skills Development as Assessed by Lecturers. Baltic Journal of Career Education and Management. ISSN 2345-0193. [viewed date 12 January 2018] Available from <http://oaji.net/articles/2014/4531392143300.pdf>

[6] Livingstone Caesar. HRPub. Horizon Research Publishing Corporation [online]. 2013. Sustaining the Supply of Ship Officers: Making a Case for Succession Planning in Seafarer Recruitment. Universal Journal of Management 1(1): 6-12, 2013. DOI: 10.13189/ujm.2013.010102. [viewed date 12 January 2018] Available from: <http://www.hrpub.org/download/201308/ujm.2013.010102.pdf>

IMPLEMENTATION OF THE ECDIS SYSTEM: AN OOW PERSPECTIVE AS AN INTEGRAL PART OF EDUCATIONAL IMPROVEMENT

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Keywords: maritime navigation, electronic chart display and information system, officers of the watch, knowledge transfer, ecdis eho.

ABSTRACT

Current year marks the completion of the Electronic Chart Display and Information System (ECDIS) implementation period. During the past three decades system evolved from its initial purpose to a complex navigation information system support tool. This transition represents substantial step in navigation, and one would expect that all related issues are shaped smoothly. From the very beginning of ECDIS implementation, Officers of the Watch (OOW) are experiencing various issues ranging from functional, operational, educational, legislative and finally, practical. Numerous organizational standards, resolutions, circulars, reports, guidelines and other documents support this fact, as well as number of ECDIS-related marine accidents, detentions and fines.

The proposed paper represents a segment of a systematically carried long-term research aiming at educational process improvement. This aim is to be achieved through specific approach, proper communication and various and subtle activities, always striving at the user-centered, often neglected issues and their solving. The particular research refers to opinions and attitudes of OOWs towards ECDIS mandatory implementation period completion. Individual knowledge has also been examined in terms of new technology perception, as well as understanding of the system. Internationally distributed questionnaire was used for this purpose. Answers were processed and analyzed together with accompanying comments. Results are shown in the context of transitional period, representing a flow of end-user opinions over the years. Observations and findings are presented and discussed. Research results are especially referring to future officers who are given an objective, immediate and critical insight, beside official education and relevant materials. In this way, OOWs are indirectly exchanging their opinions and knowledge with their younger colleagues. This interrelation, accompanied with theoretical background, is one of the center features of the research. The paper concludes with provision of possible guidelines and planned activities towards further educational improvements, but also towards system development as well.

REFERENCES

[1] Brčić, D.; Kos, S.; Žuškin, S. Navigation with ECDIS: Choosing the proper secondary positioning source. *TransNav: International Journal on Marine Navigation and Safety of Sea Transportation*. September 2015, 9(3). 317-326.

[2] Brčić, D.; Kos, S.; Žuškin, S. Partial structural analysis of the ECDIS EHO research: The handling part. In: *Proceedings of the 24th International Symposium on Electronics in Transport, 2016: ISEP'24*. Ljubljana: Electrotechnical Association of Slovenia & ITS Slovenia, 2016, pp. 80-87.

[3] Brčić, D.; Žuškin, S.; Barić M. Observations on ECDIS education and training. In: *Proceedings of 12th International Conference on Marine Navigation and Safety of Sea Transportation, 2017: TransNav'12*. London: CRC Press, 2017, pp. 29-36.

[4] Hamilton, A. C.; Nickerson, B. G. *The Electronic Chart*. Fredericton: University of New Brunswick. Department of Geodesy and Geomatics Engineering, 1982. TR102.

[5] Hecht, H. and others. *The Electronic Chart: Functions, Potential and Limitation of a New Marine Navigation System*. Lemmer: GITC, 2006.

[6] International Hydrographic Organization. *Information on IHO Standards related to ENC and ECDIS. Version 1.1.* Monaco: IHO, 2017.

[7] International Hydrographic Organization. *Current IHO ECDIS and ENC Standards* [online] Monaco: IHO, 2018 [viewed date: May 1st, 2018]. Available from: http://bit.ly/2pjmCyW.

[8] International Maritime Organization. *Model Course 1.27: Operational use of Electronic Chart Display and Information System*. London: IMO, 2009.

[9] International Maritime Organization. *MSC.232(82): Adoption of the revised performance standards for Electronic Chart Display and Information Systems (ECDIS)*. London: IMO, 2006.

[10] International Maritime Organization. *MSC.282(86): Adoption of amendments to the International Convention for the Safety Of Life At Sea, 1974. Annex 1.* London: IMO, 2009.

[11] International Maritime Organization. *NCSR 2/22/2: Report on monitoring of ECDIS issues by IHO*. London: IMO, 2009.

[12] International Maritime Organization. *MSC.1/Circ.1503 Rev.1: ECDIS – Guidance for good practice*. London: IMO, 2017.

[13] Sabelis, H. Voyage planning in ECDIS. *International Hydrographic Review*. September 1999, 76(2). 41-48.

[14] United Kingdom Hydrographic Office. *Majority of global SOLAS fleet now ECDIS ready*. Press release. London: UKHO, 2016.

[15] Weintrit, A. ECDIS issues related to the implementation of the carriage requirements in SOLAS Convention. *Archives of Transport System Telematics*. February 2015, 8(1). 35-40.

[16] Weintrit, A. International recent issues about ECDIS, E-navigation and safety at sea: Introduction. In: Weintrit, A., ed. *International recent issues about ECDIS, E-navigation and safety at sea*. Boca Raton: Taylor & Francis Group Ltd, 2011, pp. 9-12.

[17] Žuškin, S.; Brčić, D.; Kos, S. Partial structural analysis of the ECDIS EHO research: The safety contour. In: *Proceedings of 7th International Conference on Maritime Transport, 2016: MT'07.* Barcelona: UPC, 2016, pp. 246-262.

[18] Žuškin, S.; Brčić, D.; Šabalja, Đ. A contribution to improving the standards of ECDIS training. *Pomorstvo - Scientific Journal of Maritime Research.* June 2013, 27(1). 131-148.

INTERACTIVE ROOT CAUSE ANALYSIS (IRCA) AS A PRACTICAL TOOL FOR DEVELOPING MANAGEMENT SKILLS (FOR MASTERS IN NAVIGATION)

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Keywords: problem-solving approach, management level, situational awareness, accident investigation, Root Cause Analysis

Having good strong problem solving skills can make huge difference to future career of an officer. Most of all human error types on ships are caused by making ineffective solutions with sometimes painful consequences.

The standards of officers of the merchant fleet training are based on the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, as amended. There are seven functional areas, at three different levels of responsibility provided by STCW Code. The levels of responsibility are: **management level** (applied to senior officers), **operational level** (applied to junior officers) and **support level** (applied to ratings forming part of a navigational or engine watch) [1].

Master programmes are implemented be academies and universities on the second stage of higher education. These programmes imply the graduates' ability to solve difficult professional tasks and issues in complex. Master programmes additionally imply acquiring knowledge of innovative types and skills of independent research.

To obtain management level senior students must be conversant with such crucially important concepts as **situational awareness, onboard safety culture, and implementation of COLREGs** in adequate communication with the pilot, the master and OOW.

Most accidents are caused by human error, not technological or mechanical failure, the immediate cause is very often that a person made a disastrous decision. As for the management level **the accident investigation** is the most prominent part of the curriculum for Masters in Navigation for acquiring professional English skills in National University "Odessa Maritime Academy".

For the teaching strategy the 4-step approach for solving a problem can be effective and useful.

1. Defining the problem;
2. Generating alternatives;
3. Evaluating and selecting alternatives;
4. Implementing solutions.

The use of all 4 stages can vary and depend on the exact task in the definite field. Masters in navigation should look deeper to figure out the cause of the problem, fix the underlying systems and processes so that it goes away for good.

Root Cause Analysis (RCA) is a popular and often-used technique that helps people answer the questions of **WHY** the problem occurred in the first place. It identifies the origin of a problem using a specific set of steps to find its primary cause. The main things to determine are: what happened; why it happened; what actions to reduce the likelihood that it will happen again.

This technique is widely used in accident investigation by shipping companies to prevent recurrence. RCA has proven to be a powerful loss-prevention tool and allows crewmembers to discover the true root cause of a casualty. The purpose is to raise situational awareness of officers about the reason why accidents occur. If the root cause can be established and rectified, the risk of accident reoccurring is substantially reduced [2].

The problem-solving approach focuses on the analytical ability of Masters to find correct professionally-grounded solution based on theoretical knowledge and practical experience on board the vessel.

REFERENCES

[1] STCW (Standards of Training, Certification, & Watchkeeping for Seafarers) including 2010 Manila amendments. International Maritime Organization; 3rd ed., 2011 edition (March 31, 2011).

[2] Andersen, B. and Fagerhaug, T. Root cause analysis: simplified tools and techniques. ASQ Quality Press, Milwaukee, WI, 2006. pp. 1-19.

INTERNATIONAL MARITIME MANAGEMENT, M.SC.: LEARNING AND SATISFACTION IN DISTANCE-EDUCATION

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Keywords: International Maritime Management, distance education, community of inquiry, perceived knowledge growth, quality of learning process.

The paper outlines the special didactic concept of International Maritime Management (IMM) which is designed to ensure a high-quality learning process within the learning community of students and lecturers. Offering high-quality distance education courses which provide the best possible online study environment is a challenge faced by many universities. To do so, one must guarantee a successful learning experience and process, and ensure students' satisfaction thereby minimizing dropout rates. This paper shall give an overview of didactic elements ensuring the quality of students learning process and further it shall serve the question how students and lecturers can visualize students' learning process within specific module topics to provide a highly visible learning environment as proposed by John Hattie's meta-analysis on didactic measures. This paper therefore examines a measure to prove students' learning process and their perceived satisfaction within different modules of the programme.

The IMM Master degree course is a highly flexible distance education course enabling students to acquire a postgraduate degree beside their professional and private duties. The study programme has been developed within a research project involving a two-year validation period (from September 2015 until August 2017) in which the didactic concept has been tested and evaluated by more than 200 international test students.

Defining the quality of a students' learning process in a distance study environment Garrison and colleagues (2000) proposed the community of inquiry (CoI) framework model. In their theory, a successful educational experience can only be developed through the interaction of social, teaching and cognitive presence within an online learning community of students' and lecturers. Students' positive educational experience will turn into high levels of learning and satisfaction about their study course. Different studies found a strong relation between all three presences and students perceived learning, which again is related to students' perceived satisfaction in online or blended learning environments (Arbaugh, 2008; Akyol/Garrison, 2008 & 2011a). Evidence for this result is taken from transcript analysis of students' communication forums as well as from students' feedback. Within this paper, the didactic concept of International Maritime Management will be introduced explaining all elements which support the development of social, teaching and cognitive presence.

This will be followed by a detailed analysis of students' learning process, which has been quantified by asking students to rate their own knowledge connected to the module content before they start and after completing the module. Students are asked to rate their level of knowledge based on a Likert scale rating from 1 - very good knowledge to 5 – no knowledge at all. The value of the difference between both questionnaires will represent students' perceived knowledge growth on specific module topics of the IMM programme. This approach can be related to Hattie´s category of self-reported grades by which students have a very accurate understanding "of their level of achievement" (Hattie, 2008, p. 43). In his meta-analysis of 209 studies with 79,433 people, students were asked to self-estimate their achievement. Hattie reports about a "remarkably high level of predictability about achievements in the classroom" (ibid. p. 44).

Students' perceived satisfaction with the module content will be evaluated by means of a survey in which students are asked to rate their level of knowledge based on a Likert scale rating from 1 - very satisfied to 5 – not satisfied at all.

This study shall serve evidence that the instructional design of the IMM course and also the implemented didactic concept within modules are an important and successful tool for Universities to support students in their learning process and reach high levels of satisfaction among students.

REFERENCES

[1] Akyol, Z., Garrison, D. R. (2008). The development of a Community of Inquiry over time in an online course: Understanding the procession and integration of social, cognitive and teaching presence. Journal of Asynchronous Learning Networks 12(3-4), pp 3-22.

[2] Akyol, Z., Garrison, D. R. (2011). Understanding cognitive presence in an online and blended community of inquiry: Assessing outcome and processes for deep approaches to learning. British Journal of Educational Technology 42(2), pp 233-250.

[3] Arbaugh, J. B. (2008). Does the Community of Inquiry Framework Predict Outcomes in Online MBA Courses? International Review of Research in Open and Distance Learning Vol. 9(2), pp 1-21.

[4] Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. The Internet and Higher Education 2(2-3), pp 87-105.

[5] Hattie, J. A. C. (2009). Visible Learning: A synthesis of over 800 meta-analyses relating to achievement. Routlege: New York.

KNOWLEDGE MANAGEMENT AT MARITIME HIGHER EDUCATION INSTITUTIONS

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Keywords: knowledge, management, maritime higher education institution, IMO model course

ABSTRACT:

Knowledge management as a process has been defined first time in 1991 and during last two decades has been considered as one of the most important processes in all organizations where knowledge is created, captured, stored or shared. It is considered that in majority of organizations the knowledge to be managed can be captured within a single framework and is in many ways interrelated. Maritime Higher Education Institutions (MHEI) beyond any doubt belongs to organizations where knowledge management is the most important process. However, the knowledge managed by these institutions may belong to several different frameworks. Two most important are: professional knowledge as required by STCW Convention and pedagogical/academic knowledge implemented in learning processes.

In addition to these two knowledge frameworks, depending on the strategic goals or organizational structure of an institution, other areas of knowledge exist (like maritime transport, marine engineering, maritime economics, shipbuilding, port management etc.) subject to knowledge management process. Although not clearly identified, MHEIs also have implemented all the important knowledge management procedures: knowledge accumulation and knowledge transfer.

In the paper the knowledge management options at MHEIs are presented. Particular attention is paid to the relation between two fundamental knowledge frameworks managed by any MHEI and its relevance to the educational process associated with on-board management positions. Academic body of knowledge, although having relatively smaller scope when compared to professional body of knowledge, is considered not so important and not systematically developed in many MHEIs.

Additionally, the paper presents differences and similarities regarding knowledge management at institutions, members of the IAMU, participating in IAMU PAES project development and implementation. Based on the experience gained, the paper pays particular attention to the IMO Model Course 6.09, because it significantly influence the knowledge management approach implemented at MHEIs, particularly those who are closely tied with larger parent institutions. The paper presents differences among major revisions of the model course and discusses the impacts these changes may have on knowledge management.

REFERENCES

[1] Badrawi, H. and others. The Management of University Integrity, Proceedings of the Seminar of the Magna Charta Observatory, Bononia University Press, 2007.

[2] Davenport, T. Saving IT's Soul: Human Centered Information Management. Harvard Business Review, 1994, March-April, 72 (2) pp. 119-131

[3] Girard, J. Defining knowledge management: Toward an applied compendium, Online Journal of Applied Knowledge Management, 2015, 3(1), pp. 1-20

[4] Gundić, A. Ivanišević, D; Zec, D. Additional MET programs for the Masters on board LNG carriers, Proceedings of the 7th International Conference on Maritime Transport, Barcelona: Oficina de Publicacions Academiques Digitals de la UPC, 2015, pp. 131-138

[5] Horck, J, International Maritime Legislation and Model Courses, 4th IAMU Annual General Assembly, Alexandria, 2003, Egypt

[6] Jackson, P. Introduction to Expert Systems (3 ed.), Addison Wesley, Boston, USA, 1998.

[7] Khavand K.J.; Khavandkar, E. Intellectual Capital: Management, Development and Measurement Models", 3rd edition, Ministry of Science, Research and Technology, 2013.

[8] Magrassi P., A Taxonomy Of Intellectual Capital, Gartner Group, Stamford, USA, 2002.

[9] Nonaka, I. A dynamic theory of organizational knowledge creation, Organization Science, Vol. 5 No. 1, 1994, pp. 14-37.

[10] Nonaka, I; Takeuchi, H. The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation, Oxford University Press, Oxford, 1995.

[11] Sanchez, A.V.; Poblete, R.M. (eds). Competence-based learning - A proposal for the assessment of generic competences, University of Deusto, 2008.

MARITIME SECURITY TRAINING: EVOLUTION AND PEDAGOGY

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Keywords: maritime security, training, education.

ABSTRACT

The development of standards and curricula for maritime security education and training has been an important focus of the IMO and the U.S. government since 9/11. International requirements for merchant mariner security training are delineated in the International Ship and Port Facility Security (ISPS) Code, which primarily focuses on prevention of terrorist acts involving the marine transportation system. In the United States, the training of merchant mariners in maritime security matters is specified in the regulations contained in Title 33 of the Code of Federal Regulations (CFR) Subchapter H—Maritime Security, which implement the Maritime Transportation Security Act (MTSA) of 2002. Much of the language found in Subchapter H pertaining to training requirements is identical, or very similar, to that contained in the ISPS Code.

Section 109 of the MTSA required the U.S. Secretary of Transportation to develop standards and curricula for maritime security personnel training. This charge was delegated by the Maritime Administration to the U.S. Merchant Marine Academy, which then developed model maritime security courses for vessel and facility personnel. The academy's work on the MTSA project led to its responsibility for developing, jointly with the government of India, the initial International Maritime Organization (IMO) model courses: Ship Security Officer, Company Security Officer, and Port Facility Security Officer.

The IMO published these model courses for use by training providers, carriers, and others worldwide. Subsequently, the joint Maritime Administration/United States Coast Guard MTSA Section 109 Committee worked to develop and oversee a national maritime security course certification program. In May 2008, the U.S. Coast Guard issued regulations mandating approved training for vessel security officers based on the MTSA model curriculum.

In early 2011, at the request of the Coast Guard, the U.S. Merchant Marine Academy reviewed the mandates contained in the 2010 "Manila amendments" to the IMO STCW Convention and Code, along with other regulatory developments, revising and expanding the IMO maritime security curriculum to provide increased security competency for merchant vessel and port facility personnel worldwide.

The U.S. Coast Guard in 2012 commissioned the U.S. Merchant Marine Academy to develop a comprehensive program of training for Facility Security Officers as called for in Section 821 of the Coast Guard Authorization Act (CGAA) of 2010, resulting in several draft model courses and detailed program recommendations.

Maritime security education and training at the U.S. Merchant Marine Academy consists of courses required by international convention and national regulations, hands-on experience acquired through simulation exercises and cadet shipping, applied research on security topics, and higher-level security education for those enrolled in one of the Academy's academic majors.

REFERENCES

[1] J. Helmick, Ship Security Officer, (Model course 3.19) (2012 edition), London: International Maritime Organization, 2012.

[2] J. Helmick, Security awareness training for port facility personnel with designated security duties (Model course 3.24), (2011 edition), London: International Maritime Organization, 2011.

[3] J. Helmick, Security awareness training for all port facility personnel (Model course 3.25), (2011 edition), London: International Maritime Organization, 2011.

[4] J. Helmick, Security awareness training for seafarers with designated security duties (Model course 3.26), (2011 edition), London: International Maritime Organization, 2011.

[5] J. Helmick, Security awareness training for all seafarers, (Model course 3.27) (2011 edition), London: International Maritime Organization, 2011.

[6] J. Helmick and D. Compton, MTSA model maritime security course 08-01: Vessel Security Officer, Washington, DC: U.S. Department of Transportation, Maritime Administration, 2008.

[7] J. Helmick and D. Compton, MTSA model maritime security course 08-01R: Refresher course for Vessel Security Officer, Washington, DC: U.S. Department of Transportation, Maritime Administration, 2008.

[8] J. Helmick and D. Compton, MTSA model maritime security course 05-01: Maritime security for military, first responder, and law enforcement personnel, Washington, DC: U.S. Department of Transportation, Maritime Administration, 2005.

[9] J. Helmick and D. Compton, MTSA model maritime security course 04-01: Maritime security for vessel personnel with specific security duties, Washington, DC: U.S. Department of Transportation, Maritime Administration, 2004.

[10] J. Helmick and D. Compton, MTSA model maritime security course 04-02: Maritime security for facility personnel with specific security duties, Washington, DC: U.S. Department of Transportation, Maritime Administration, 2004.

[11] J. Helmick and D. Compton, MTSA model maritime security course 04-03: Maritime security awareness, Washington, DC: U.S. Department of Transportation, Maritime Administration, 2004.

[12] J. Helmick, D. Compton, and Anglo Eastern Maritime Training Centre, Ship Security Officer (Model Course 3.19), (2003 edition), London: International Maritime Organization, 2003.

[13] J. Helmick, D. Compton, and Anglo Eastern Maritime Training Centre, Company Security Officer (Model Course 3.20), (2003 edition), London: International Maritime Organization, 2003.

[14] J. Helmick, D. Compton, and Anglo Eastern Maritime Training Centre, Port Facility Security Officer (Model Course 3.21), (2003 edition), London: International Maritime Organization, 2003.

[15] J. Helmick and D. Compton, Maritime Transportation Security Act of 2002: Section 109 Implementation, A Report to Congress, Washington, DC: U.S. Department of Transportation, Maritime Administration, 2003.

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Thematic Element: Enhancing cooperation & social responsibility in the maritime field

Maritime Training for Emergent Opportunities

Intro: The traditional model for maritime training has been coursework leading toward either a deck or engine credentialed graduate. Given the changing nature of regulation and the introduction of new technologies these lines have become blurred. New positions such as Electro-Technical Officer and Environmental Officer have become standardized over the last decade. One of the largest ongoing regulatory change has been in environmental regulation and the goal of clean shipping. This paper will focus upon the Environmental Officer Position and the cross training recommended for a deck or engine officer to successfully carry out the duties of the position.

Body: Todays cruise industry represents the strongest growth segment of marine industry employment both aboard and ashore.. The position of E/O is unique to the industry afloat however the responsibilities and training for the job transition well to positions ashore in all maritime segments.

The knowledge for the position encompasses our traditional training with crossover, particularly for deck students needing emphases in engineering systems. The additional training unique to the position includes- Environmental Management-Environmental Law-Public Health-Marine Pollution-Environmental Hazard Communication. Soft skills needed are public speaking-writing-spreadsheet analysis….

Our institution is in the process of taking existing classes both inside and outside ones major to create a certificate program to encompass the required knowledge for the position.

This paper will examine the duties of the position. It will also discuss the coursework suggested for a career in the environmental aspects of shipping and logistics both afloat and ashore.

NEED FOR COLLABORATIVE LEARNING IN MARITIME EDUCATION AND TRAINING

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Keywords: Maritime Education and Training, Collaborative learning, Maritime competency

ABSTRACT

Maritime Education and Training (MET) has been traditionally oriented towards the vocational and practical aspects of education for seafarers and relied on *"in situ"* training for preparing competent seafarers [1]. With the introduction of new technologies and automated systems onboard the ships, the purview of training and assessment for modern seafarers needs revision and consideration. In the forthcoming years, with the use of novel technologies and eventual transformation in the nature of maritime operations, new skills and competences will be required for the seafarers. The learning and development of modern high-risk operator is increasingly been directed to optimize their fit within the complex socio-technical system with the focus on how to complement individual training with the need for co-ordination with other agents in the system. In this work, we look at the concepts from collaborative learning in educational sciences and discuss its potential for enhancing training of seafarers. Collaborative learning can be defined as co-construction of knowledge and competence development where different people have the opportunity for creative thinking, introducing new ideas and taking creative actions [2]. Collaborative learning is argued to provide other benefits associated with it rather than pure cognitive gains such as social and motivational gains occurred during learning [3]. Such approach is required in the future frameworks for maritime training where learning and knowledge creation will be framed as part of work integrated in the working processes. We conduct a review of existing certification and competence requirements for seafarers (including STCW convention, DNV-GL competence certification, etc.). We narrow down to some of the specific instances of training and assessment in MET and provide alternative approaches to them based on the specific concepts from collaborative learning frameworks.

REFERENCES

1. Manuel, M.E., *Vocational and academic approaches to maritime education and training (MET): Trends, challenges and opportunities.* WMU Journal of Maritime Affairs, 2017. **16**(3): p. 473-483.
2. Goggins, S.P. and I. Jahnke, *CSCL@ Work: Computer-supported collaborative learning at the workplace—making learning visible in unexpected online places across established boundaries*, in *Computer-supported collaborative learning at the workplace*. 2013, Springer. p. 1-20.
3. Strijbos, J.-W., *Assessment of (computer-supported) collaborative learning.* IEEE transactions on learning technologies, 2011. **4**(1): p. 59-73.

PATERNALISTIC LEADERSHIP IN A DISTINCTIVE MARITIME WORK ENVIRONMENT: A STUDY AMONG MARITIME STUDENTS

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Keywords: Paternalistic leadership, maritime training.

LEADERSHIP IN MARITIME WORK ENVIRONMENT

Effective leadership is an important part of a distinct maritime work environment. An appropriate and effective leadership style will not only improve job satisfaction, commitment, dedication and motivation of seafarers; but will also have the impact of creating a positive safety culture onboard. Although traditionally leadership training had been offered in many maritime education institutions, after the introduction of the STCW 2010 amendments, leadership training has become a compulsory and essential part of Maritime Education and Training (MET). According to STCW Code, demonstration of "effective leadership behaviours" is required as criteria for evaluating competence. No specific leadership behaviours or style is imposed with the code. This approach is concordant with the situational leadership theory where leaders adapt his/her leadership style according to goal(s) that require followers commitment and performance under varying circumstances.

Today one of the primary traits that make a good effective leader is his/her ability to appraise and comprehend the constantly changing but distinct nature of a maritime work environment and to adapt their leadership style this diverse environment. Leaders should also have knowledge and intercultural competence as it concerns different types of leadership styles appropriate for the given environment.

Paternalistic Leadership

Paternalistic leadership is a father-like leadership style [1] and combines strong discipline and authority with fatherly benevolence [2]. Although paternalistic leadership originated from traditional Chinese culture [3] and also it is a prevalent cultural characteristic of traditional eastern societies such as China, Japan, India, and Korea [4], recent results suggest paternalistic leadership may generalize across cultures [5].

Formal and structured roles and duties, high turn over rates among crew, high level of stress, demanding and high risk work, multinational and multicultural crew composition, limited social interaction and social isolation makes the maritime work environment distinctive. In this distinctive work environment positive paternalistic leadership may be an option for ship captains as an effective leadership style and help them to improve their intercultural competence and awareness.

Paternalistic leadership is one of several leadership styles that a leader can keep in their managerial tool box to be used when called for in the appropriate work environment. One of the many positive effects its shares with other managerial tools is that it can create a safety culture that is an important element

for developing an environment in which individuals are motivated to report errors and incidents that improve situational awareness to break error chains. It also gives consideration to cultural factors such as power distance that influence how people of different backgrounds interpret and respond to people according to a perceived hierarchy. It can be the right tool to getting the job of having diverse crews work together more effectively done.

A study has been performed in order to determine the perceptions of maritime students about paternalistic leadership determinants. This study was done by utilizing a survey tool developed by Aycan [6] that was applied to the cadets at the Maine Maritime Academy. The study group consisted of students majoring in studies of Marine Operations and Engineering and gave further consideration to, amongst other things, class year standing, and gender. This study will contribute to the leadership literature by analyzing levels of acceptance of the paternalistic leadership maritime education and training domain.

REFERENCES

[1] R. Westwood and A. Chan, Headship and leadership, in R. Westwood (Ed.), Organizational behaviour: Southeast Asian perspectives. Hong Kong: Longman. pp.118-143. 1992.

[2] J. L. Farh, and B. S. Cheng, A cultural analysis of paternalistic leadership in Chinese organizations. In J. T. Li., A. S. Tsui, & E. Weldon (Eds.), Management and organizations in the Chinese context. London: Macmillan. pp. 84-127, 2000.

[3] H. King-Ching and C. Yin-Che, "Development and significance of paternalistic leadership behavior scale", Asian Social Science Vol. 7, No. 2, pp.45-55, (2011).

[4] C. Bor-Shiuan, L. Chou, W. Tsung-Yu, H. Min-Ping, and F. Jiing-Lih, "Paternalistic leadership and subordinate responses: Establishing a leadership model in Chinese organizations", Asian Journal of Social Psychology, Vol. **7**. pp. 89–117, (2004).

[5] E. K. Pellegrini, T. A. Scandura and V. Jayaraman, "Cross-cultural generalizability of paternalistic leadership: an expansion of leader-member exchange theory", Group & Organization Management, Vol. 35. pp. 391-420, (2010).

[6] Z. Aycan, Paternalism: Towards conceptual refinement and operationalization, In K. S. Yang, K. K. Hwang, & U. Kim (Eds.), Indigenous and cultural psychology: understanding people in context. New York, NY: Springer. pp. 445–466, 2006.

PHYSICS LABORATORY EXPERIMENTS AT THE BARCELONA FACULTY OF NAUTICAL STUDIES

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Keywords: Introductory course, Physics, Experimental works, Evaluation, Learning at FNB.

INTRODUCTION

Physics lectures are a common subject of the three four-year degree programs that can be studied at the Barcelona Faculty of Nautical Studies (FNB) in the Polytechnic University of Catalonia (UPC). The students of Nautical and Maritime Transport, Marine Technologies (Marine Engineering), and Naval Systems Engineering and Technology must attend the Physics subject as compulsory during the first academic year. This subject, of 9 ECTS, introduces the basic concepts that will be developed in the following courses in Engineering subjects, in correspondence with the STCW agreement for the degrees of Nautical and Maritime Transport (necessary to achieve the Pilot professional qualification), and Marine Technologies (necessary to achieve the Marine Engineer professional qualification). The Physics subject syllabus includes classical mechanics, fundamentals of fluids, vibration phenomena, wave concepts (including light and sound); as well as, an introduction to thermodynamics and fundamentals of electromagnetism.

In order to achieve a better understanding of the studied phenomena, some experimental works are performed during the course. The assesses of these experimental works come from the compulsory assistance and the written reports delivered by the students after each experiment. These experiments are divided in two introductory individually performed works at home; four works using simulators carried out in a computer classroom for groups of two students; and other four works, with small experimental instrumentation that can be used in the classroom. The experimental setups have been sturdily designed at low cost.

The writing reports allow the teacher to evaluate the progress and give a feedback to the students in order to improve their writing and synthesis skills for which the students must become familiar with computer programs as MS_Office or similar. Besides to help to develop these abilities, the data processing performed in every experiment force the students to learn other useful tools like Excel^{R} / LibreOffice, MatLab or equivalent. The evaluation proceeds with the help of rubrics for each report, to set the importance of the methodologies and the ability on data processing and displaying, as well as extracting conclusions from the obtained results.

The evaluation of the Physics subject is carried out according to the provisions given in the teaching guide, which is in agreement with the "*Verifica"* documents approved by the Spanish Ministry [1, 2], by default following the indications of continuous assessment given at the UPC and the recommendations in [3, 4]. In this case, the experimental and simulation work (the practices) represents 25% of the total mark, 45% corresponds to an exam to be done at the end of the course (improperly called "final" by the students), and the remaining 30% corresponds to the continued assessment of the course through partial exams, online tests and other homework.

ACTUAL PRACTICES

The actual list of practices is the following:

0: The measure of friction coefficients between body surfaces and statistics (at home)

0 ': The measure of gravity with the help of a pendulum (at home)

1: Relative motion (Rotating system of reference) and Coriolis acceleration (simulator)

2a: Movement with friction: Stopping of a ship (with navigation simulator or videos)

2b: Stopping of a ship: Numerical integration of the movement.

3: Superposition of waves (simulator)

4: Interference of waves (simulator)

5: Doppler effect (simulator)

6: Cooling of a body as a function of time (small instruments in class)

7a: Magnetic field on the axis of a magnet as a function of distance, observation on the compass

7b: Magnetic field on the perpendicular to the axis of a magnet as a function of distance, observation on the compass

8: Lens focal lengths and optical images (small instruments in class)

Other practices have been tested some years, as experiments on simple mechanical vibrations (mass and spring, measuring changes in oscillation frequency with changes in mass), control of a satellite launcher to get in orbit (with simulator), Millikan experiment (with simulator), determination of local horizontal magnetic field (comparison with compass of the field from a double-coil with given electrical current and local field). The practical works actually in use seem the most adapted to the students' interest because of the relation with the contents of the careers that they are following. The length of the course makes possible to ask for 10-12 practices done, because of the different time spent in complex practices, during a 15-week course.

The experimental works have been designed to help the students to understand complex physics phenomena such as the Coriolis effect, the frictional forces related to navigation and their dependence with velocity, or the dynamics of the cooling and heating processes. The experimental laboratory practices selected to be performed in the Physics subject are related to what seafarers might encounter in their professional work. Furthermore, the systemic delivery of writing reports improves the writing skills and force the students to review the subjects and study them.

Finally, the contact with the students shows that they appreciate more the practices that allow contact with real instruments, even though work with computers and simulators is also acknowledged.

REFERENCES

[1] https://www.upc.edu/content/grau/guiadocent/pdf/esp/280601 (consulted 28 Feb 2018)

[2] https://www.upc.edu/content/grau/guiadocent/pdf/esp/280633 (consulted 28 Feb 2018)

[3] A. Isalgue, J.F. Dominguez: "Estrategias y criterios de evaluación de Fundamentos Físicos en la Facultad de Náutica de Barcelona (FNB-UPC)". VI Congreso Internacional Docencia Universitaria e Innovación (CIDUI), Barcelona, July 2010 (in Spanish)

[4] A. Cadenato, A.; Martinez, M.; Amante, B.; Jordana, J.; Sánchez, R.; Farrerons Vidal, Oscar.; Isalgue, A.; Fabregat, J. "Criterios para actividades de evaluación de calidad". VII CIDUI: La universitat, una institució de la societat / La universidad, una institución de la sociedad // The university, an institution of society. CIDUI Congrés Internacional de Docència Universitària i Innovació., July 2012. Available at: <http://www.cidui.org/revistacidui/index.php/cidui/index>. ISBN 978-84-695-4073-2

RETHINKING STCW EDUCATION TO COPE WITH INCREASED AUTONOMY AND AUTONOMOUS SHIPPING

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Keywords: STCW, Autonomous, Education, Control Systems.

INTRODUCTION

The increasing complexity of systems onboard ships and within systems, that the students at maritime academies is educated towards operating and maintaining, is requesting a somewhat different kind of approach for teaching system interrelations and system governance, which in general is considered traditionally for marine engineers in automation and for master mariners partly in navigation and partly in ships technology. Especially the path towards autonomy in the overall governance of the system calls for an analysis of the implied competences which is to be expected by the operators and maintenance engineers and a comparative analysis with the teaching strategy of today in order to generate validated advises on how the teaching strategy of tomorrow should be structured in order to cope with the challenges. In order to obtain knowledge of the implied competences, the teaching environment for the designers of these systems is taught to be a valuable source for predicting design strategies of future systems. For marine systems, one of the top most world leading universities within system interrelations and system governance is the Norwegian University of Science and Technology (NTNU), where this area of research has been given the overall framework of cybernetics. This paper present an analyse of the teaching environment in marine cybernetics at NTNU and perform a comparative analysis of the conceived implied competences with the teaching environment of SIMAC of today and, based on that gap analysis, generate validated advices for future teaching strategy in system interrelations and system governance for the different studies at SIMAC. The methodology involves observations of lectures and group work, interviews with identified key persons, interaction with the study environment and meta cognitive analysis of course evaluations.

General differences between universities and maritime academies

The general differences between university education and STCW training at maritime academies can be summed up as consisting of the differences in the emphasis laid down on mastering general competences within mathematics, physics and chemistry. Where the universities put much effort into raising the students' general competences to a very high level before venturing into more specialised knowledge areas, the general approach in STCW training and the overall approach at SIMAC is to teach general competences alongside with specialised knowledge. Many pro and cons can be raised for both approaches. One of the main advantaged of the university approach is the students' ability to use linear algebra and among this especially the matrix calculus. This gives the university students' an ability to generate highly reliable lumped sum mathematical models within a wide variety of scientific fields also including the technical areas covered by STCW training. Within STCW training, the students' is also educated to use mathematics to model physical systems but seldom in the frame of matrix calculus.

Matrix Calculus versus other approaches in multivariate calculus

In the physical world that surrounds us all, physical properties very seldom depends on only one variable. As a seafarer, very often one has to consider a variety of variables that all influences the system of interest may it be the operation of the main engine, the travelling path of the vessel or the loading condition of the hull. All of these areas is increasingly modelled and supervised by autonomous systems [1], which in their essence is designed by use of multivariate calculus. In general, multivariate calculus

can be thought of as a system of interrelated variables for which, equations can be formulated. Solving these equations simultaneous yields the state of the system. One way of writing this is given in equation 1 for three independent variables, {x, y, z}, where {a, b, c, d} represents arbitrary known constants.

$$ax = b\ ;\ y = cx;\ z = dx \tag{1}$$

Solving this equation in recursive manner for each variable is a straightforward task, which should be manageable by any high school graduate and much like the way STCW training handles mathematical description of physical systems. Writing the same equation in a matrix calculus format as given in equation 2 may seem by first look to be making the problem more cumbersome.

$$[x,y,z]^T = [b/a,0,0;0,cb/a,0;0,0,db/a][1,1,1]^T \tag{2}$$

However, this framework of writing the mathematical formulation of the physical system yields a tremendous simplification of systems with multiple variables and complex dependencies which can be solved using mathematical software. Even more importantly, the majority of all discrete control systems in the marine environment are written by use of matrix calculus. An important feature of multivariate calculus is the stability in the system of equations and thereby the stability in the physical system that the system of equations models. Often in control systems, this stability is ensured by choice of suitable constants for the equations [2]. Often these constants are laid out for the operator to adjust during operation, like e.g. the settings in the autopilot. Very often the systems is designed in a way, where choices can be made of variables that makes the system unstable, which ultimately can result in total failure of the system. Thus for enabling the understanding and competent interaction with control systems calls for good command of matrix calculus and a general understanding of the design structure of control systems for all operators and especially for maintenance engineers.

How to structure education in marine control systems

Taking the command of matrix calculus as a prerequisite for teaching in control systems enables a number of interactive ways for structuring the learning process. It makes it possible for the students' to build their own control systems, operate already build models and gain valuable insights in the design structure of control systems by a comprehensive and meta-cognitive learning process, where the individual student gain the competence to analyze any system based on its appearance and responses to interaction. An important asset is a reliable suite of mathematical modelling and simulation software. It is a huge advantage, if the mathematical modelling software is made available and used throughout the education across all disciplines for all calculation purposes, whereas simulation software is only relevant for specific subject matters. As for physical systems interaction, it is not so important exactly how the physical system is structured as long as it gives a reliable representation for the subject matter, e.g. a small ship model can easily give the sufficient learning of the physical system interaction for how to design, operate and analyze ship motion control. On top of this, it is important to have an active researching staff of educators, who interacts with the industry and is capable of supporting the development of new knowledge and methods.

Conclusion

It was found through this research project, that matrix calculus yields an important fundamental knowledge level for understanding and design of control systems. The application of mathematical modelling and simulation software expands these competences further and access to physical systems for experiments and analysis together with a researching staff of educators yields the possibilities for reaching an expect level and thus enables operation, maintenance and design of autonomous systems.

REFERENCES

[1] Sørensen, A. J., Marine Control Systems, Propulsion and Motion Control of Ships and Ocean Structures, 3rd Edition. akademika forlag, 2013.

[2] Khalil, H. K., Nonlinear Systems, 3rd Edition. Pearson, 2002.

ROLE OF ECDIS TRAINING ON IMPROVING SITUATIONAL AWARENESS

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Keywords: ECDIS training, situational awareness, voyage planning

ECDIS TRAINING

August of 2018 marks the completion of the phasing in of ECDIS carriage requirements on SOLAS vessels engaged in international voyages. Additionally, more and more flag states are implementing similar ECDIS and/or ECS carriage requirements for vessels engaged in domestic trade within their territorial waters. Mariners are required to receive training in accordance with IMO Model Course 1.27 "Operational use of Electronic Chart Display and Information Systems" to serve as the Officer in Charge of Navigation Watch (OICNW) on ECDIS equipped SOLAS vessels and some countries look for this same level of training to serve on their domestic fleet's vessels if they're equipped with either ECDIS or ECS. This is understandable considering the complexity of these navigation systems, yet even with this training requirement marine incident investigation organizations are still identifying improper use of ECDIS as a causal factor in groundings, which implies that rather than improving situational awareness these systems, at least in some cases, enables complacency [1], [2],[3],[4],[5]. This paper describes the authors efforts to gauge the effectiveness of ECDIS training by through a statistical analysis of surveys completed by students before and after formal generic ECDIS training. The surveys are designed to measure the attitudes of the students towards value of ECDIS in maintaining situational awareness and improving safety of navigation.

ECDIS is not only an e-navigation tool which can be used to satisfy the nautical chart carriage requirement of SOLAS, but can also totally change the way/method of performing marine navigation[6],. ECDIS will be the focal point and main hub for Integrated Bridge Systems when configured as a Multifunction Display device where all the voyage related data and information from different sources such as propulsion, navigation control systems, steering systems, alarms etc. can be reached, seen and used as a "decision support system" for routine and emergency situations.[7]

Situational Awareness

According to Endsley [8], Situational Awareness (SA) is "the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future". SA is comprised of three levels: perception - perceiving critical factors in the environment; comprehension - understanding what those factors signify; and projection - anticipating what will happen, or how the situation will evolve, in the near future. These levels are cumulative in nature as projection cannot occur without comprehension and comprehension cannot occur without perception.
Accident investigation results reveal that loss of SA has directly responsible for 27 percent of marine accidents [9]. ECDIS can play an important role for developing and maintaining a high level of situational awareness by supporting appraisal, planning, execution and monitoring phases of voyage planning.

The goal of the work upon which this paper is based is to determine the attitudes of ECDIS trainees towards the effectiveness of the system to increase situational awareness during voyage execution and monitoring and also in creating detailed and safe voyage plans. To gauge the soundness of the training a survey is given at the beginning of the training period and again at the end of the training period. A statistical comparison of the two surveys enables a subjective determination of whether the provided training is indeed having the desired effect, acceptance of tenants of ECDIS best practices as being an invaluable tool for increasing awareness of stationary and moving hazards to navigation that may threaten safe navigation.

REFERENCES

[1] Marine Accident Investigation Branch, "Report on the investigation of the grounding of, CFL Performer, Haisborough Sand, North Sea,12 May 2008," Report No 21/2008 December 2008.

[2] Marine Accident Investigation Branch, "Grounding of CSL Thames in the Sound of Mull 9 August 2011", Report No 2/2012 March 2012.

[3] Marine Accident Investigation Branch, "Report on the investigation of the grounding of MV Maersk Kendal on Monggok Sebarok reef in the Singapore Strait on 16 September 2009", Report No 2/2010, March 2010.

[4] Marine Accident Investigation Branch, "Report on the investigation of the grounding of Ovit in the Dover Strait on 18 September 2013, report no 24/2014 September 2014

[5] Marine Accident Investigation Branch Report on the investigation of the grounding of Muros Haisborough Sand North Sea 3 December 2016, Report No 22/2017 OCTOBER 2017

[6] E. Asyali, "The role of ECDIS on improving situation awareness" 13th Annual General Assembly of the IAMU, St. John's, Newfoundland and Labrador Canada, ISBN: 978-088901-439-9. PP:136-123. 15, (2012).

[7] IMO Resolution MSC.64(67) "Adoption of new and amended performance standards for integrated bridge systems" (1996)

[8] M. R. Endsley., "Toward a theory of situation awareness in dynamic systems", Human Factors, 37(1), pp 32-64, (1995).

[9] C. C. Baker and A. K. Seah "Maritime accidents and human performance: the statistical trail", ABS Technical Papers, (2004).

SEA TRAFFIC MANAGEMENT VALIDATION PROJECT AND THE EUROPEAN MARITIME SIMULATION NETWORK (EMSN)

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Keywords: STM, EMSN, Simulation.

SEA TRAFFIC MANAGEMENT (STM) VALIDATION PROJECT

The STM Validation Project is a three-year Project with a 43 million Euro budget, co-financed by the European Union, which will run from 2015 to the end of 2018. Over 50 partners are involved from 13 countries with private, public and academic sectors all involved, with the Swedish Maritime Administration (SMA) acting as the lead authority. Partly inspired by the European SESAR program, which looked at the next generation of Air Traffic Management in the aviation industry, STM's goals are to improve safety, operational efficiency and environmental performance in the Maritime Industry by proposing a standardised digital method of information sharing between all interested actors in the maritime chain, which is a good example of the IMO's e-navigation policy. The STM Validation Project follows on from the MONA LISA and MONA LISA 2.0 Projects, which defined the concept of Sea Traffic Management and will set out to validate the concepts in large-scale test beds in both the Nordic and Mediterranean regions. This will encompass up to 300 vessels, 13 Ports and 5 Shore based Service Centres as well as 13 Simulation Centres in the connected European Maritime Simulation Network (EMSN).

The European Maritime Simulation Network (EMSN)

Several simulator centres around Europe, incorporating three different simulator manufacturers, have been and are interconnected in what is called a European Maritime Simulator Network (EMSN), which gives a unique possibility in creating scenarios with a large number of participating own ships. Information is shared between different simulation centres by the Distributed Interactive Simulation (DIS) protocol and all bridges are connected by Teamspeak VOIP to simulate VHF communications. Special Electronic Chart Display and Information (ECDIS) systems have been fitted to each Bridge, equipped with the prototype STM Tools, including the facility for Route sharing between other simulated own ships and simulated shore centres. The EMSN was set up during the MONA LISA Projects in 2014 and has been enhanced for the STM Validation Project by the addition of more Centres making a total of 13 connected sites and over 30 simulated own ships; further organisations have expressed a desire in joining the EMSN in the future. The primary purpose of the EMSN is to gain experience with STM features and to understand how involved persons and institutions deal with its capabilities. This is done in a simulated environment, which saves large amounts of time, costs and environmental impact and for certain situations such as complex traffic situations, Search and Rescue and Ice Navigation, is a safer alternative to live testing. The continued use of the EMSN after the STM Validation Project has been completed is being explored for activities such as further research work and educational purposes.

The use of the EMSN in the STM Validations

In order to evaluate the STM concepts, a series of carefully crafted simulation exercises were created and run in a controlled environment to capture as much data as possible. The types of exercises included:

- Two one and a half hour exercises in the English Channel and Southern Baltic regions; these were run both without the STM Tools (Baseline Exercises) and with the STM Tools enabled.
- Search and Rescue exercises in the Gibraltar Straits area.
- Ice Navigation in the Kvarken Area of the Gulf of Bothnia
- Six Short/Controlled Scenarios to further explore the use of Ship to Ship Route Exchange in anti-collision situations.

Participants manning the Bridges were volunteers comprising of professional mariners with either a Master's, Chief Mates or OOW certification depending on the role they were carrying out and they were given identical briefings at each Simulation Centre.

STM EMSN Simulations Analysis

This was split into:

- Performance Analysis: comparing the differences (if any) of what actually happened between the Baseline Exercises and those run with the STM Tools.
- Human Factors analysis: by the use of a Background Questionnaire, In-Scenario Workload Diary to assess mental workload and situational awareness, Post-Scenario Questionnaires, Human Factors Behavioural Observations and an end of the day verbal debrief session.
- Safety Analysis: using a Safety Index Model developed by Chalmers University in Gothenburg.

First EMSN Simulator Runs with STM Tools 13-16 March 2018 at Warsash:

Between 13th and 16th March 2018, Warsash Maritime Academy (WMA) welcomed 16 enthusiastic Mariners from a variety of Maritime backgrounds to take part in the first week of EMSN Simulation runs with the STM Tools enabled. Briefing each day commenced at 07:30 (to tie in with the more leisurely start time for those in CET) and after a Bridge acquaint and a familiarisation exercise, they undertook the role of either Master or OOW on one of the two WMA Bridges in two main simulation exercises. The scenarios have been carefully designed to test out as many different aspects of STM as possible both on the Ship's Bridges and at the simulated Shore Centres, one of which was located at WMA simulating STC Southampton for the English Channel Scenario.

STM Services that were tested included the use of: Ship to Shore Route Exchange, Route Cross-Checking, Shore Centre sending suggested changes to Routes as well as complete "Pilot Routes", Enhanced Monitoring, Navigational Assistance, use of Chat and Ship to Ship Route Exchange (S2SRX). There were some technical hurdles to overcome in the few short weeks leading up to the trials and although not everything worked as well as it was hoped, some excellent lessons were learned and much valuable feedback was obtained from the participants.

STM Results

As the STM Validation Project is not due to complete until the end of 2018, the full analysis and report writing is yet to take place.

REFERENCES

[1] STM Validation Project Web Site: http://stmvalidation.eu/

SEAFARERS EDUCATION, TRAINING AND CREWING IN UKRAINE

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Keywords: Maritime Education and Training, Crewing, Certification.

Nowadays, Ukraine is among leaders as for officers' supplying country to the world maritime labour market. Changes in maritime education and training system in Ukraine will widen the possibility for Ukrainian seafarers to be employed on board vessels entitled to fly the flags of almost all countries, in all basins of the oceans, and contribute to the high prestige of our maritime personnel and enhancement of the positive image of Ukraine.

According to the information of UNCTAD and in accordance with the report of BIMCO/ISF world maritime fleet supplies about 1545000 working places for the seafarers in international shipping. Nearly 51% of positions are for officers, 49% - for ratings. It is the first time in the history when the officers' rate became larger in comparison to ratings.

During 2005-2015 a global demand for seafarers increased up to 45% which corresponds to the increase of world shipping for the same period. The biggest amount of seafarers is provided by China (243635), followed by Philippines (215500), Indonesia (143702), Russian Federation (87061), India (86084) and Ukraine (69000). There is an analysis concerning the number of seafarers including the officers taking into account the population of the above-mentioned 6 countries which provide the biggest amount of the seafarers for global shipping. Total number of valid seafarers' certificates issued in Ukraine is 111920. The five non-EU countries which had more masters and officers holding their CoCs recognized by EU Member States were the Philippines (33966), Ukraine (23192), Russian Federation (16381), India (7626) and Turkey (6377).

The specialists' training in the seagoing specialties in compliance with the requirements of the STCW Code and STCW Convention in Ukraine is conducted by 7 higher educational establishments. Most of students of sea-going specialties study in Odessa. The number of students enrolled in 2017 for the first year of study for different educational levels in educational institutions of Ukraine for the programmes leading to the obtaining of the certificate of competence is 5380: Junior Specialist – 1967; Bachelor – 2718; Master – 695.

Ukrainian Seafarers' Training and Education System can be characterized by the obligatory "educational" degree obtained as a result of successful completion of the formal educational program. This degree allows getting a specific diploma, which gives the right to occupy the officer position on a vessel (Certificate of Competency). There are special rules in Ukraine defining the procedure of rank awarding to the seafarers. According to these rules, a corresponding degree of higher education is an essential condition to obtain the Certificates of Competency, which meet the operation and management level of the STCW Code. The programs of higher maritime education provide realization of the Model Courses of IMO and include an indispensable practical training as the obligatory component. The programs of maritime education combine such components which lead to necessary professional skills as well as the components, providing knowledge and understanding of corresponding sciences, principles of equipment operation and technological processes, development of cognitive skills. As a result, a high level of the Ukrainian seafarers' competence is achieved and the skills of situation awareness and decision making in unforeseen situations and restricted resources conditions are formed. Accordingly, the officers' training is conducted at higher maritime educational institutions.

National Certification Regulations should be amended as a result of the changes in the higher education structure. New Regulations should provide, as before, the overall structure of seafarers' training and certification based on the higher maritime educational establishments, and opportunity for the officers to acquire new competences and corresponding new qualifications gradually. Most likely, future Regulations will not consider the Master Degree obligatory for getting Certificate of Competency of the STCW Code management level.

Many foreign companies with long-term programs for Ukrainian seafarers on board their vessels invest significant funds into personnel training with the help of their own "cadets programs", giving sponsor support to maritime training institutions, creating their own training centers. In the

framework of cadets programs together with training institutions they select cadets in compliance with the company's requirements, organize planning and control over complying with on-board training programs. Companies cover all expenses connected with on-board training. It should be emphasized that almost all companies have their representative offices in a large number of maritime countries of the world. The level of training of our graduates meets the requirements of our partners. This fact explains the interest of international shipping leaders in Ukraine.

Taking into account all above-mentioned we consider the following as the perspectives of development:

Promoting an integrated approach to maritime affairs, good governance and exchange of best practices in the use of the marine space;

Promoting sustainable development of coastal regions and maritime industries as a generator of economic growth and employment, including through the exchange of best practices;

Promoting strategic alliances between maritime industries, services and scientific institutions specializing in marine and maritime research, including the building of cross-sectoral maritime clusters;

Endeavoring to improve maritime safety and security measures and to enhance cross-border and cross-sectoral maritime surveillance to address the increasing risks related to intensive maritime traffic, operational discharges of vessels, maritime accidents and illegal activities at sea;

Support of cadets' on-board training by all interested parties including companies, IMEC and other organizations, maritime administrations, International Maritime Organization, reconstruction and maintenance of training vessels;

Motivation of professors and instructors of educational establishments from the side of the companies, providing opportunities of working at sea and at educational institutions including internships and cadets' training supervision.

REFERENCES

[1] Review of Maritime Transport 2016 / Report by the UNCTAD secretariat. – New York and Geneva: UN, 2016. – 116 p.

[2] Manpower Report: The world supply and demand for seafarers in 2015// BIMCO/ISF. – 2015. – 118 p.

[3] Rolls-Royce opens autonomous ship research and development centre in Finland. Available from: <https://www.rolls-royce.com/media/our-stories/press-releases/2018/25-01-2018-rr-opens-autonomous-ship-research-and-development-centre-in-finland.aspx>.

[4] World's First Autonomous Ship to Launch in 2018. Available from: <http://fortune.com/2017/07/22/first-autonomous-ship-yara-birkeland/>.

[5] Countries in the world by population. Available from: <http://www.worldometers.info/world-population/population-by-country/>.

[6] Seafarers' Statistics in the EU. Statistical review (2015 data STCW-IS). Lisbon: EMSA, 2017. Available from: <http://emsa.europa.eu/emsa-documents/latest/item/3094-seafarer-statistics-in-the-eu-statistical-review-2015-data-stcw-is.html>.

[7] Seafarers' Statistics in the EU. Statistical review (2014 data STCW-IS). Lisbon: EMSA, 2016. Available from: < http://www.emsa.europa.eu/emsa-documents/latest/item/2779-seafarer-statistics-in-the-eu-statistical-review-2014-data-stcw-is.html>.

[8] Miyusov, M.V. and others. Implementation of the 2010 Manila Amendments to the STCW Convention and Code in Ukrainian MET System. In: Logistics and Economic Matters – Marine Navigation and Safety of Sea Transportation. London: Taylor & Francis Group, 2013, pp. 55-59.

[9] Miyusov, M.V. Upcoming Changes in Ukrainian Maritime Education and Certification System. International Scientific Conference "Science and Technology for Sustainable Maritime Development": Conference Proceedings, Varna: Nikola Vaptsarov Naval Academy, May, 13-14, 2015, pp. 72-77.

SUGGESTED ADVANCEMENTS IN MARINOR WATER SAFTY AND PERSONAL SURVIVAL TECHNEQUES

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Keywords: Water Survival Training.

ABSTRACT

American maritime colleges are responsible for educating the next generation of students on ocean survival techniques. This essential training is designed to prolong the survivability of the mariner at sea.

All maritime institutions, are required to offer the minimum Standards of Training, Certification and Watchkeeping for Seafarers (STCW) requirements. But as a regular practice, there is no consistency between institutions when it comes to supplementing their water survival training with other activities. In a recent survey most maritime schools showed a lack of uniformity in this respect. In fact, supplemental training is left to the discretion of the institution and its practicality in the curriculum.

In the past, the driving force behind improvements in water survival training and equipment resulted from catastrophic events. These events, involving loss of life are given top priority and can force change in safety regulation. But with growing geopolitical unrest, vast increases in maritime commerce, and further advancements in technology, a more complete review of supplemental water safety and survival training needs to be addressed.

This paper offers a history of Maritime College water survival training and offers purposed changes in the current training. This new methodology seeks to educate today's mariner in a variety of in water survival methods, combining, personal rescue techniques, group survival activities, with and without equipment, and elementary first aid.

These purposed changes in supplemental water survival training will give Today's mariner the ability to adjust better to difficult situations using a variety of in water emergency options. These purposed changes are meant to improve the minimum standards, not to replace them. Offering a distinct perspective on present-day Water Safety & Personal Survival training techniques. There is a need to go above the minimum STCW standards and establish uniformity throughout all maritime college and universities.

REFERENCES

[1] Acts of Congress, Related to Steamboats. Collated with the rolls at Washington. Boston: Little, Brown and Company 1853. https://archive.org/stream/aft7919.0001.001.umich.edu#page/n3/mode/2uphresh

[2] Brooks C.J. Designed for Life, Lifejacket Through the Ages, Mustang Engineered Technical Apparel Corp. 1995. Print.

[3] Cooper Kenneth H. MD, MPH. Website, Cooper Aerobics. www.cooperaerobics.com/About/Our-Leaders/Kenneth-H-Cooper,-MD,-MPH.aspx accessed date, 11/10/2017

[4] Coyle Grethen F. Whitcraft Deborah C. Inferno at Sea, Stories of Death and Survival board the Morro Castle. Down the Shore Publishing, 2012. Print.

[5] Executive Officer's diary, quote, Retrieved from Stephen B. Luce Library Archives

[6] Fay Donald 'RE: PE 103/PE 100 Swim Survival Courses. "Received by Downey James, Nov. 2017. Professor Physical Education Maritime College 1980-2016. Personal stall accounts Oct. 20, 2017

[7] Fink Ernest. "Re: PE 103 /PE 100 Swim Survival Courses." Received by Downey James, Nov. 2017. Related to, Fink Ernest Captain Coast Guard Ret, Personal student accounts, 1971-1975. Oct. 25, 2017

[8] IMO.org SOLAS 1914, 1930, 1948, 1960, 1972. Accessed 10/12/2017. Website www.imo.org/en/KnowledgeCentre/ReferencesAndArchives/HistoryofSOLAS/Pages/default.aspx

[9] National Transportation Safety Board Washington DC, Marine Accident Report, United States Bulk Carrier Marine Electric capsizing and sinking about 30 nautical miles east of Chincoteague, Virginia February 12, 1983. NTSB/MAR-84/01

[10] Newport training ship executive officer's diary, dated, May 3, 1912 Image. Retrieved from the Stephen B. Luce Library Archives

[11] Rattray Jeannette Edwards, The Perils of the Port of New York, Maritime Disasters from Sandy Hook to Execution Rocks. Dodd, Mead & Company, New York 1973. Print

[12] Stonehouse Frederick, Wreck Ashore, U.S. Life-Saving Service, Legendary Heros of the Great Lakes. Lake Superior Port Cites Inc. 2003 Print.

[13] Thresh Peter. Titanic The Truth Behind The Disaster. Crescent books, 1992.

[14] U.S. Coast Guard Washington, DC 20593, Marine Casualty Report SS Marine Electric O.N. 245675, Capsizing and Sinking in the Atlantic Ocean on 12 February 1983 with multiple loss of life. U.S. Coast Guard Marine Board of Investigation Report and Commandant's Action Report No. 16732/001 HQS 83.

[15] University of Virginia Historical collection related to the American Red Cross, Wilbert Longfellow,http://www.redcross.org/news/article/Red-Cross-Teaches-Skills-That-Can-Save-A-Life, paragraph on Water Safety

[16] Vecchio Peter, Re: PE 103/ PE 100 Swim Survival Course Received by Downey James, 17 Nov. 2017. Related to, Peter Vecchio Associate Prof. of Navigation and Marine Transportation Chief Mate (Relief), TS Empire State. Personal student accounts, 1988-1992. November 16, 2017.

[17] Whitfield B. East, Library of Congress Cataloging-in-Publication Data, 2013 A historical review and analysis of Army physical readiness training and Assessment. ISBN 978-0-9855879-9-4 (alk. paper)

[18] Williams Joseph A. Four Years Before the Mast, A history of New York's Maritime College Fort Schuyler Press. 2013. Print.

THE DEVELOPMENT OF A QUALIFICATION BOARD TO DOCUMENT ENGINEERING CADET PERFORMANCE AS PART OF A TRAINING PERIOD AT SEA

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Keywords: Engineering, Cadet Assessment, At-Sea Training.

INTRODUCTION

There are a number of ways of assessing student performance, including examinations, observation of specific activities, and individually observed demonstration of specific skills or knowledge. When evaluating the performance of engineering cadets during the at sea portion of their training to become professional mariners, there often have been questions regarding the efficacy of these assessments to measure a cadet's readiness for the merchant marine. This paper describes the Assessment review conducted by the Engineering faculty at Maine Maritime Academy (MMA) and the resulting decision to implement a process of a Qualification Board for junior engineering cadets. The pre-existing assessment methodology will be detailed and the process of developing and implementing the Qualification Board Process prior to and during the 2018 MMA Training Cruise will be described.

Engineering Cadet Performance Assessment

The use of a Board of Senior Officers to conduct a final review of a mariner's readiness for additional responsibilities has been a part of many Navy's officer qualification processes for hundreds of years. This paper will detail some of that history, as well as the methods used for cadet assessment by MMA through the 2017 Training Cruise conducted by the school. That process involved multiple methods of assessment and concluded with a final assessment day that included examinations, demonstrations and completion of cruise and Standards of Training. Certification, and Watchkeeping for Seafarers (STCW) checklists (check-offs). As part of MMA's continuous improvement process and surveys of both cadets and instructors, there was a general dissatisfaction concerning both the operation of this process and its efficacy in actually reflecting the cadet's knowledge and performance.

Addition of a Qualification Board

As a result of dissatisfaction with the prior assessment methods, the overall assessment plan has been modified and, as part of this change, a final Qualification Board will be added for each junior engineering cadet. The details of this process will be discussed in the paper, but the Qualification Board will provide for a more structured and interactive final assessment, with clear methodologies and standards for successful completion. Additionally, the Qualification Boards replace the "Flashlight Examinations" which took place in the engine room and had limited effectiveness due to the test environment. This assessment will allow the cadet to demonstrate knowledge of the subject materials and skills, while also allowing evaluation, by multiple senior officers, of the cadet's maturity and performance during a stressful situation. The Qualification Board is expected, when combined with the other aspects of the assessment program to be detailed in the paper, to provide a more complete and accurate assessment of each cadet's readiness for their career.

Results of the Modification to the Assessment Process

Ninety-Six (96) Qualification Boards were conducted on the 2018 Summer Sea Term. The process evolved as the series of examinations occurred, using feedback from both faculty and cadets. Overall,

the process fulfilled the goal to improve the assessment of junior engineering cadets. Specifics of the process and results will be detailed in the paper and conference presentation. This added assessment technique appears to have merit and likely would improve the assessment of practical skills and knowledge at any maritime university.

Conclusion

This paper will highlight the assessment methods used to determine engine cadet performance during the MMA Annual Training Cruise and the development and implementation of the new step of using Qualification Boards to improve that process. Details of both the Qualification Board development process and its first period of implementation will be shared in the paper and subsequent conference presentation.

REFERENCES

[1] Rodger, N. Commissioned officers' careers in the Royal Navy, 1690–1815. In: *Journal for Maritime Research* [online] 2001 3:1, 85-128. [viewed date 24 May 2018]. Available from < https://doi.org/10.1080/21533369.2001.9668314>

[2] Landers, C. Command History 1989 (OPNAV REPORT 5750-1) [viewed date 24 May 1989]. Available from<https://www.history.navy.mil/content/dam/nhhc/research/archives/ command-operation-reports/ship-command-operation-reports/c/crommelin-ffg-37-i/pdf/1989.pdf>

THE IAMU-PAES-P PROJECT IMPLEMENTATION BENEFITS: THE MAAP EXPERIENCE

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Keywords: IAMU 2018, two-pages abstract, Barcelona.

ABSTRACT

This paper presents a study on the benefits of the Peer-Assisted Self-Evaluation Scheme (PAES)-P (Philippines) conducted on October 25-26, 2017 in MAAP Philippines, by a group of international experts from IAMU. Further, this paper presents background and rationale on the participation of MAAP, the purpose, and tools used in the PAES-P self-evaluation; the principles, methods, process, phases, and tools used in the PAES-P peer –evaluation; the PAES evaluation form and its coverage. Further, the benefits from the PAES-P project as perceived by the MAAP community composed of the MAAP officers, faculty and staff and by the randomly selected students who were interviewed in the process were analyzed. The 30 comments or qualitative data generated were reduced to 20 and further quantified using the Likert 5-rating scale to determine the extent of satisfaction on the identified benefits of the said project. Likewise, the 20 comments were categorized or summarized into eight significant benefits, and the MAAP community ranked the same. The eight implementation benefits were abbreviated as IAMU-PAES with identified P or perceived Problems or challenges in the implementation of the IAMU-PAES-P project. The paper ends with concluding remarks and recommendations

REFERENCES

[1] Francic, V. Askholn, J, Ljungklint, J. and Yutaka E (Feb 11, 2018), a 14-page IAMU-PAESP Report on the Site Visit to MAAP

[2] Lam, Ricky (2010) A Peer Review Training Workshop: Coaching Students to give and Evaluate Peer Feedback in TESL Canada Journal Vol 27 No 2 Spring 2010 pp. 114 -127 Retrieved at https://files.eric.ed.gov/fulltext/EJ924064.pdf on Feb 14, 2018

[3] McLeod, S. A. (2008) LIKERT Scale. Retrieved from www.simplypsychology.org/likert-scale.html on February 11, 2018

[4] Min, H.T. (2005) Training students to become successful peer reviewers. System, 33, pp 293-308.

[5] Savita (2017) Self -evaluation, peer-evaluation, patient satisfaction and utilization review retrieved from www.slideshare.net/MnSavita/self-evaluation-peer-evaluation on February 15, 2018

[6] Zec, Damir (2015) IAMU Peer Assisted Self - Evaluation Scheme (PAES) Manual, University of Rijeka O.C. Zienkiewicz and R.C. Taylor, The finite element method, 4th Edition, Vol. 1, McGraw Hill, 1989.

To ENHANCE ENROLLMENT OF FEMALE CADETS AT MARITIME INSTITUTIONS AND TO INCREASE WOMEN SEAFARERS IN THE SHIPPING INDUSTRY

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Keywords: women in maritime industry, female cadets, enrollment, maritime institutions,

Shipping has historically been a male dominated industry and that tradition runs for a long time. However, recently the need to advance women's role in maritime activities has become a topic of unprecedented interest. It has been widely agreed that it is time to enhance opportunities for women to be educated and gain experiences in the maritime sector, and it is particularly crucial nowadays because of the constant emergence and potential application of new technology, such as autonomous ships, unmanned cargo ships, etc. Equally important is changing the culture in the maritime field to reduce the prejudices women encounter on a daily basis and social bias against women entering the industry.

Changes are quite noticeable in the many maritime areas. There are more and more female role models for young women to follow in the maritime industry, such as Captain Tshepo Motloutsi of South Africa qualifying to earn the position in 2016, Kate McCue, the first American female to captain a mega-cruise ship last year, and successful women entrepreneurs, like MF Shipping group CEO Karin Orsel, who is also the president of WISTA International. The enrollment of female cadets in maritime institutions all over the world has been going up year after year. For instance, the Massachusetts Maritime Academy (MMA) of USA started to recruit female cadets in 1980, and in 2017, had a record high of 17% of female cadets enrolled in the undergraduate maritime programs. At Dalian Maritime University of China, all the seagoing majors, including navigation, started to accept female cadets in 2015. Maritime companies hire an increasing number of female graduates on board for diversities of workforce and skill sets of the young women. A good example was that last year Bio-Gene Technology, a pharmaceutical company, wanted to hire one female cadet of Marine Engineering major from MMA, but ended up hiring both female cadets recommended by the academy. The application of new technology in the maritime area makes it possible for female seafarers to qualify equally, if not better than men for maritime jobs.

This paper presents an analysis of what maritime institutions can do to advance the opportunities for women to survive and thrive in the maritime field, and empower female cadets with skill sets to embrace the new era of technologically facilitated maritime industry. Taking Massachusetts Maritime Academy as a case-

study entity, applying school wide questionnaires and data collected over the course of about 40 years, the paper examines the exact measures a maritime institute could use to increase the enrollment of female cadets, to give female cadets the exact skills and trainings which would help them face the challenges and climb the shipping sector ladder, to prepare them culturally and socially to blend in well with their male peers in the work-place and to enhance the efforts of female cadets to gain adequate support from both family and society for them to enter the maritime industry and be successful in jobs and career development.

The preliminary findings suggest that job market success upon graduation and subsequent career development of the senior female cadets will have more impact on the enrollment and growth rate of female enrollment at MMA than the remote role models in the maritime industry. Support and encouragement from their family and friends account hugely in their selection of the maritime sector. With the on-going study of the topic, and further analysis of the survey results, more interesting findings will surely be generated.

It becomes especially useful to study thoroughly the experiences of one maritime institution, since for nearly forty years, from 1980 to 2017, Massachusetts Maritime Academy of USA has made significant efforts to recruit and graduate more female cadets. It has established a school curriculum, including sea terms, internships and classes that empower young women to gain proficient skills to survive and thrive as do their male cohorts, and has given tremendous help to female cadets in securing jobs upon their graduation and to do well in their future careers. The successful stories drawn from the study would provide an inspiration for other maritime institutions all over the world, and potentially serve as a valuable reference for maritime companies and maritime authorities.

REFERENCES

[1] H. Aggrey, "Women in the maritime industry: a review of female participation and their role in Maritime Education and Training in the 21st century" (2000). World Maritime University Dissertations. 383. http://commons.wmu.se/all_dissertations/383

[2] Q. Chen, " Let number speak: job opportunities and international exchange programs for female maritime cadets", in M. Kitada, E. Williams and L. Froholdt, editors, Maritime Women: Global Leadership, WMU Studies in Maritime Affairs, Volume 3, pp. 129-142, Springer, 2015.

[3] T. Walker, "Why we need more women in maritime industries", World Economic Forum, September 04, 2015

TRAINING ENGINEERS FOR REMOTELY OPERATED SHIPS OF THE FUTURE

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Keywords: engine room simulator training, autonomous ships, remotely operated ships.

ABSTRACT

A key driver within the development of today's maritime technology is the quest for autonomous or rather the remotely operated ships. It is inevitable that shipping in the 21st century and beyond will progress towards remotely operated ships, utilising the advancement in technology and engineering already making a significant impact within a range of vehicles linked to the aerospace industry and underwater operations. Once the autonomous ship Yara Birkeland is in operation later this year, the reality of such vessels and the required competencies of the marine engineers to remotely operate such vessels will be clearer [1].

As seen in the introduction of any new technology, the initial breakthrough is fraught with difficulty, but once that stage is successfully overcome, it settles into an accepted routines and trends. This stage is followed by a relentless pursuit for improvements, as economic factors will drive the industry to improve and expand the technology and its use.

The success of future remotely operated ships will depend on several factors such as:

a. reliability of the machinery;
b. accuracy of the instrumentation and control systems; and
c. critical thinking and decision-making ability of the remote operators.

The first two factors depend on technology while the third depends on the training and human factors.

It should also be remembered that beyond the engineering challenges associated with remote ships, the effective application of autonomous technology would depend upon the environment in which it is deployed. It is not just the physical maritime environment that needs to be considered, but also the business, regulatory and legal environments that all present significant challenges affecting the development and application of the technology itself. [2]

This paper investigates and discusses how modern training tools, such as engine room simulators, can be used to instill critical thinking and decision making of engineers to enable them to remotely operate ships with minimum downtime and heighten safety.

The past, current and future trends in marine engineer training

Ever since machinery were employed for ship propulsion, engineers were required to operate, maintain and repair the main propulsion machinery and the assorted auxiliary systems scattered across the vessels. The training philosophy for engineers in the past dictated apprenticeships and engineer cadet schemes with a mix of shore and ship based training. The certification required appropriate duration of sea service with certain propulsion machinery and both written and oral assessments. Once

qualified, the engineers at various levels of competency required further sea service plus associated education/training in order to appear for further written and oral assessments to progress up the hierarchy.

The off the job (shore based) training for engineers for certification mainly attempted to provide theoretical concepts and practical training, usually delivered separately. It is unfortunate that this continues to happen to date, with many Maritime Education and Training (MET) institutes categorizing the theoretical subjects as 'Part A' and the practical or operational subjects as 'Part B'.

In many cases, the certificate of competency examinations also tend to separate them, with the 'Part A' subjects often treated as less important or relevant, although the overall curriculum requires both theoretical and practical subject knowledge for certification. In reality, the engineers need a range of competencies in order to successfully carry out their duties. To achieve these competencies, engineers require exposure to both theory and practice. However, as there is less emphasis on Part A subjects, students tend to gravitate towards paying more attention to the learning of operational concepts, as they are perceived as more relevant and pivotal in their final examinations and on ships

The knock-on effect of the whole practice is that engineers do not see the theory-practical connection. Although some find it within their ability to analyze and theorize some of it, a considerable void exists in engineers in grasping real situation that may hamper their critical thinking and problem solving skills, which is essential for the future marine engineers who operate the autonomous ships.

In this paper it is suggested how modern engine room simulators can be employed to upskill the operational aspects in order to impart improved critical decision making ability to engineers, enabling them to successfully carry out the required tasks associated with remotely operating the next generation of ships.

The modern full mission engine room simulators come with an array of possible malfunctions that can occur in machinery, providing exercise designers with the capability to develop integrated training and assessment of engineers for remote operations. The proper exploitation of these capabilities within the simulator environment can narrow the gap between the delivery and assessment of theory and the practical components discussed above.

An example is the gap that has been created between the electrical engineering theory and practice within the marine engineering curriculum. In many cases, this is viewed as two different areas rather than being treated as an integrated learning and assessment function. This paper shows how the smart use of the engine simulator enables the integration of the theoretical and practical components within the combined training and assessment processes. This enables the students to think critically when faced with operational and emergency issues, thus providing better and more qualified solutions. Another gap that exists is in instrumentation and control, where the theoretical concepts do not adequately support the practical training within the curriculum. The paper will investigate the issue and propose the solutions based on capabilities of modern simulators, such as creating extreme conditions that is not possible with normal operating ships.

Finally, the overall effort is to utilize engine simulators to upskill the future remote operators of autonomous ships with balanced theoretical and practical training that will enable them to bring the ship to port as on-board repairs and maintenance out at sea will be non-existent in future ships.

REFERENCES

[1] The World's first autonomous ship to debut in 2018, The Marine Professional, the Institute of Marine Engineering, Science and Technology, 10 May 2017.
[2] Global Marine Technology Trends 2030, Autonomous Systems, Lloyds Register Group Ltd, QinetiQ and University of Southampton, pp. 5, August 2017, ISBN 978-1-5272-1347-0

Using SCAT Analysis to Evaluate the Effects of Sailing Vessel Training on Emotional Quotient (EQ) Competencies

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Keywords: sailing vessel training, emotional quotient, sailing duty training, steps for coding and theorization (SCAT)

INTRODUCTION

It is thought that not only improvement in the knowledge and skill of vessel operation has an effect, but the sail training has an effect in the improvement in competence relevant to emotions, such as leadership, teamwork, and communications skills. Authors showed that sailing vessel training was effective to EQ competences, such as leadership and teamwork in improvement (2015). Moreover, we showed that sailing vessel training was more effective as compared with motorship training (2016). First, we made the questionnaire the instructor and the trainee in order to investigate the contents which influence the training effect of a sailing vessel. Since the instructor and the trainee supposed that sailing duty is the contents of training which show the training effect most, in order to investigate the factor, we analysed the trainee's essay into sailing vessel training. In this study, the trainee's essay into sailing vessel training, especially sailing duty were analysed using SCAT (Steps for Coding and Theorization) which is the qualitative data analysis technique by 4 step coding. Since theorization by SCAT was tried, we report a result.

Investigation of the contents which influences the training effect of a sailing vessel

In order to investigate the contents which influence the training effect of sailing vessel training, the questionnaire was carried out to 72 trainees who trained by sailing vessel Kaiwo Maru just before the end of training. The same questionnaire was carried out to 18 training ship veteran instructors with 10 to 33 years of experience. A trainee's reply to the following questions is shown in Figure 1. Which is the contents which you consider that a trainee's improvement in EQ competencies has an effect? (multiple answers allowed) The most effective content which improved in EQ competencies from the figure was sailing duty training. "Training of climbing the mast" and "Important maintenance work such as masts paint" which are peculiar to a sailing vessel also are effective. On the other hand, although it is not peculiar to a sailing vessel, "the events, such as an athletic meeting," and "preparation of the event" are considered to be effective.

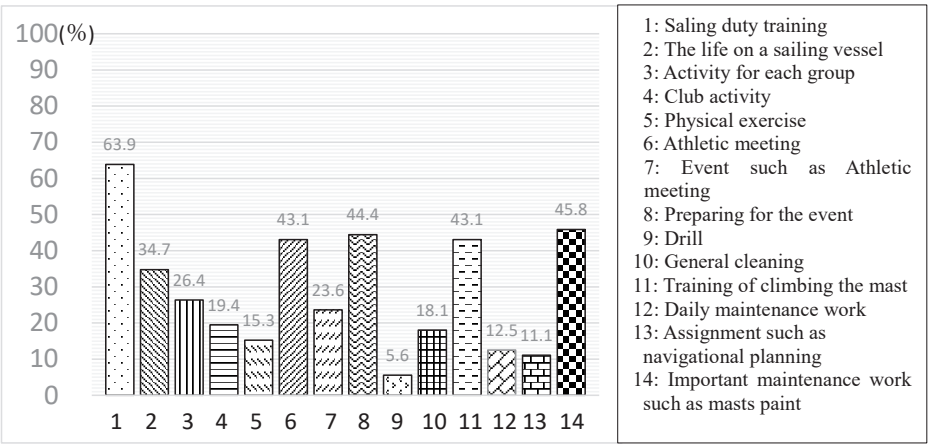

Figure 1. The result of a trainee's reply

Qualitative analysis by SCAT

Since trainee answered that sailing duty training was the most effective, we carried out qualitative analysis of the essay into sailing duty training. Qualitative analysis was conducted using SCAT which is the qualitative data analysis technique by 4 step coding. <1>The first step extracts noteworthy words or phrases from the text which is the essay which the trainee wrote. <2>The next second step is paraphrasing of <1>. <3> Third step is conceptualizing out of the text that account for <2>. <4> The theme and constructs in consideration of context which are drawn from <3> are written out. Thus, storylines are described from four steps of coding results, and, finally theoretical description is performed. The following theoretical description was drawn by SCAT.

(1) The trainee realized a natural wonder and greatness by carrying out a sailing under canvas. It is the power of moving a huge ship. It is the power in which man does not reach simultaneously. And it is power which man is made to consider deeply.

(2) In order to carry out a sailing under canvas, the trainee keenly realized that teamwork and communication were indispensable.

Summary

It is shown that the sailing vessel training is effective in improvement in EQ competencies, and it is thought that sailing duty training is effective in the sailing vessel training. In sailing duty training, the trainee can feel nature closely and has great influence on them. Cooperation of many people is required for the voyage of a sailing vessel, and a trainee is asked for EQ competencies including teamwork in order to achieve sailing under canvas. Many elements which raise EQ capability are contained in the sailing vessel voyage.

REFERENCES

[1] Y. Kunieda, at al, Study on the Training Effect of the Sail Training, International Association of Maritime Universities 16th Annual General Assembly, Proceedings, pp.167-172, 2015.

[2] Y. Kunieda, at al, Study on the Training Effect of the Sail Training, International Association of Maritime Universities 17th Annual General Assembly, Proceedings, pp.50-55, 2016.

[3] T. Otani, The proposal of the qualitative data analysis technique SCAT by 4 step coding, Bulletin of the Graduate School of Education and Human Development, Educational School, Nagoya University, 54(2), pp.27-44, 2008.

Maritime Environment

RISK REGIONAL ZONATION OF ENVIRONMENTAL POLLUTION ON THE PORT OF HAI PHONG, VIETNAM AND THE SURROUNDING AREA

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Keywords: marine pollution, risk zonation, port and maritime activities.

INTRODUCTION

The Port of Haiphong has been recognized as the largest seaport in the North of Vietnam by cargo volume, which offers advanced facilities, complete and safe infrastructure suitable for multi-modal transportation and international trade. The Port of Hai Phong consists of different main branches, including Chua Ve Terminal, Tan Vu Terminal, Hoang Dieu Port, Dinh Vũ Port, Tan Vu Port. Cargo throughput at the Port of Hai Phong in 2015 was 23,748,843 (MT) and 14,407,703 TEUs. The Vietnamese government is planning to upgrade the Port of Hai Phong. The Lach Huyen Port is being built as a general port and container port (Figure 1). This will be the main wharf area of the Hai Phong Port, being capable to receive ships of 50,000 to 80,000 DWT by 2020. Dinh Vu area is being dredged and renovated to be able to receive ships of 20,000 to 30,000 DWT. Another port will be built in Yen Hung as a specialized wharf that can accommodate 30,000 to 40,000 DWT vessels. In addition, there is the Nam Do Son wharf used for national security. These explanation and the growth of international trade in the Port of Hai Phong has resulted in corresponding rapid growth in the amount of goods being shipped by sea as well as the impacts on the marine environment. For many years, the port operations and maritime activities in Hai Phong have caused significant damage to water quality and subsequently to marine life and ecosystems, as well as human health [1].

This study presents an approach to carry out the regional risk zonation of marine pollution on the Port of Hai Phong and the surrounding area. The comprehensive risk index values were calculated and a quantitative risk zoning map can be obtained on the basis of risk index system. The quantitative risk zoning map helps risk analysts and scientists to explore the spatial nature of the risk of marine environmental pollution, exposure and effects, and provides a basis to implement control measures as a part of the environmental risk prevention and management for the largest seaport in the North of Vietnam.

2. MATERIALS AND METHODS

To assess the environmental pollution risk, the research region should first be divided into smaller units. The rectangular grid method was applied as the zonation unit in this study. The smallest grid size was 0.55 km^2 and the largest grid size was 22.17 km^2. The total number of calculated grids was 40. The total calculated domain (along the coastline) was about 310 km^2.

According to the Vietnamese regulation [2], the environmental pollution risk on each grid (I_g) comprises three criteria, namely the risk of pollution (I_p), the extent of pollution impact (I_i), and the vulnerability of risk receptors (I_v). The environmental pollution risk index is defined by Formula (1). All of the above indices have different component indices which are quantified by scoring from 1 to 4. In this study, the risk of pollution (I_p) was accessed and ranked according to maritime risk factors,

maritime risk management and status of marine water quality. The extent of pollution impact (I_i) was determined based on the results of a hydrodynamic model developed for these areas. The vulnerability of risk receptors (I_v) was scored depending on actual natural and socio-economic characteristics in each zonation unit and by the judgment of a panel of experts. The comprehensive risk index (I_g) was divided into 4 categories: very high risk area where $I_g \geq 2.5$; higher risk area where $2 \leq I_g \leq 2.5$, medium risk area where $1.5 \leq I_g < 2.0$, and low risk area where $I_g < 1.5$.

$$I_g = (2I_p + I_i + 3I_v)/6 \quad (1)$$

The results of the comprehensive risk indices were mapped by using GIS tool and then a zonation map of environmental pollution was obtained.

3. RESULTS AND DISCUSSION

The result showed that the Port of Hai Phong and the surrounding area comprised four zones according to very high, high, medium and low risk degrees of marine pollution (Figure 1). The areas of red color are very high risk zones which made up 6% of the study area. These areas were located at the Cam River channel (from Hoang Dieu Port to Tan Vu Port) and in the Ha Nam channel. The channels of Bach Dang and Lach Huyen had a high risk of marine pollution (in orange color in the Figure 1) and accounted for 30% of the study area. The areas of yellow color in the Figure 1 are medium risk zones which make up 28% of the study area. These are the estuary areas located outside the marine access channel leading into the ports of Hai Phong. About 36% of the study area belonged to low risk zones (in green color in the Figure 1). This area included the offshore of Hai Phong city.

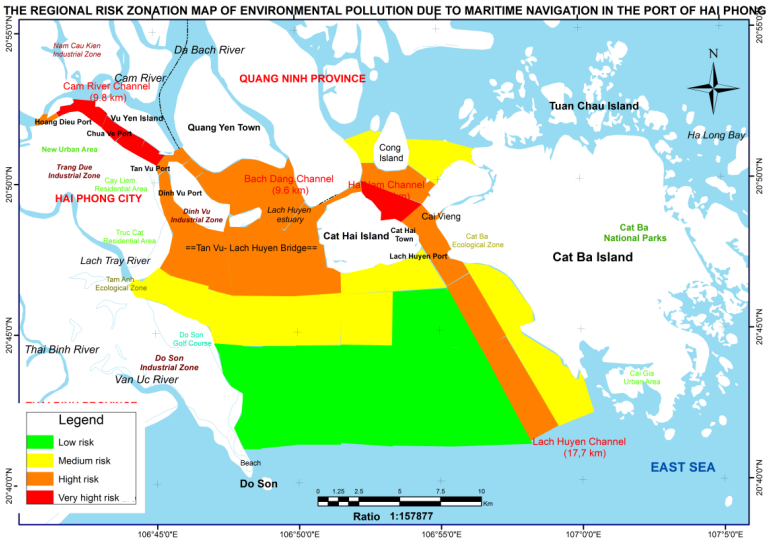

Figure 1: The regional risk zonation map of environmental pollution due to maritime navigation in the Port of Hai Phong

REFERENCES

[1] Trang, C. T. T; Lan, T. D.; Nghi, D. T; Huong, D. T. T. "Environmental Conflicts in the Coastal Zone of Hai Phong City", J. Mari. Sci. Technol., Vol. 12(3), pp 46 – 56, (2012).

[2] MONRE, Vietnam Regulation on criteria of risk classification and zoning of environmental pollution at sea and islands, Vietnam Ministry of Natural Resources and Environment, 2016.

A SIMULALATION ON TRANSPORTATION OF SUSPENDED SEDIMENT DUE TO THE MAINTENANCE DREDING OF THE CAI LAN INTERNATIONAL CONTAINER TERMINAL, VIETNAM

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Keywords: Maintenance dredging, Cai Lan, Deflt3D.

INTRODUCTION

Cai Lan International Container Terminal (CICT) – a newly established seaport – is located in Bai Chay, Ha Long, Quang Ninh province. CICT is a joint venture company between SSA Holdings International – Vietnam (SSAHVN), a subsidiary of the American Company – Carrix, Inc., and Cai Lan Port Investment Consortium from Vietnam (CPI). The terminal went into operation from August 2012 and fully completed its construction in February 2013 [1]. The project is expected to cost $US155 million for the first phase with the container handling capacity started from 520,000 twenty-foot equivalent unit (TEUs) in 2012 and has increased to a capacity of 1.2 million TEUs at its full capacity. CICT holds a 50-year license to develop, design, finance, construct, equip and operate berths 2, 3 and 4 at Cai Lan port. The CICT has a 10 meter access channel draft at low tide, a 13 meter draft at the berth, a total quay length of 594 meters, a 25 hectare container yard. The port was initially equipped with four 17-wide quay cranes and now have another two cranes later. CICT offers shipping lines significant cost savings by enabling the deployment of larger container ships which cannot call at the Hai Phong Port due to draft restrictions. This provides much needed capacity to the market, improves Vietnam's competitiveness and supports the expected growth in Vietnamese exports.

Maintenance dredging is undertaken every three years and generates about 50,000 m^3 of dredged material. All dredged material is disposed at an offshore disposal site designated by the responsible government authority about 42 km from the Cai Lan Port, outside the Ha Long Bay area, near Long Chau Island and 2 km from the access channel. The site has 20 m depth and has the capacity to take 12 million m^3 of deposit. CICT has characterized the chemical quality of the material to be disposed at the designated site to confirm that it conforms to the allowable quality. In addition, CICT performs water quality monitoring of suspended solids, turbidity and benthic community before, during and after dredging operations.

The purpose of the study is to assess the impacts of the maintenance dredging of the CICT on the environment of the Ha Long Bay. The assessment focuses on the simulation about transport of suspended sediment at the dredging site and the dump site.

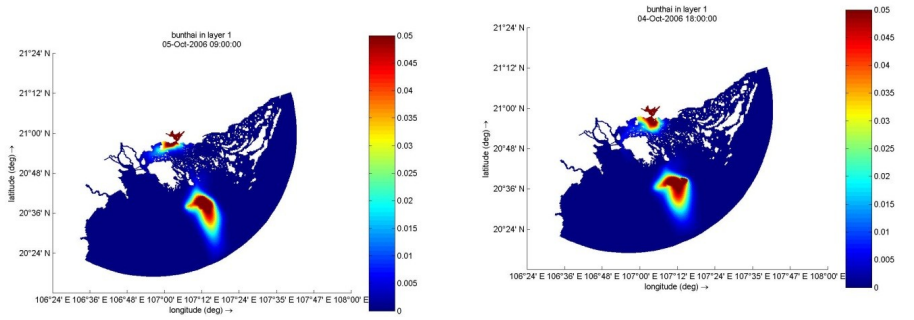
MATERIALS AND METHODS

The 2-D tidal current - wave and dispersion and transportation of suspended sediment (SS) modeling were developed by applying the DELFT-3D model. The dispersion and transportation of dredged soil is simulated during dredging and after dumping. On the model boundary, land limitations were at the hydrological stations at Do Nghi, Cua Cam Quang Phuc, Man, Troi and Bang. Sea limitation was an arc which had a radius of 75km from the Terminal. Bathymetry data at the deep sea was extracted

from DEM Etopo2 map for the East Sea. Bathymetry data near the coastline was the surveyed data. The hydrodynamic model grid had 378*483 nodes with a minimum grid size of 35 m at the dredging site and dump site. The maximum grid size of 500 m was on the open sea. Computational time step of 1 minute was taken. Simulation time was set from 20/5/2017 to 30/6/2017. Landward boundary conditions were hydrological data as well as SS concentrations which were extracted from the observed data. Open sea boundary conditions are tidal water level and wave. Initial condition for SS was uniform value and was the lowest value derived from the measured data. Wind data was also added in the simulation. Model calibration and verification carried out with the computational timestep, roughness, and dispersion coefficients. Available hydrological data for these processes was the surveyed water level and current data at Hon Dau station, tidal estimated data at Cat Ba, Cua Ong and Hon Gai. The SS data for these processes was taken from the survey results in April 2016.

RESULTS AND DISCUSSION

The results of the study showed that at the dumping site, the flow had Northeast - Southwest direction with the velocity of 0.1 m/s. At the dredging site, the flow had North – South direction with the velocity of 0,25m/s. The maintenance dredging of the CICT polluted the Cua Luc Bay. It took a month for the suspended substance concentration to go back to the initial state after the dredging finishes. The suspended substance concentration in the core zone of the Ha Long Bay was about 0.01 kg/m^3 and much lower than that of the Vietnamese standard for marine water quality. However a part of the buffer zone, where was about 2-3 km far from the dredging site, was locally polluted. At the dump site, the suspended substance concentration was higher than the Vietnamese limitation for marine water quality. However, the dump of dredged material did not cause any problem to the water quality of the Ha Long Bay. According to the modeling results, the offshore dumping site could be moved 7 km landward.



(a) (b)

Figure : The distribution of suspended sediment concentration (kg/m^3) at the dredging site and the dump site during food tide (a) and ebb tide (b)

CONCLUSIONS

The maintenance dredging of the CICT does not affect the water quality in the core area of the Ha Long Bay, but has polluted to the Cua Luc Bay and a part of the buffer zone of the Ha Long Bay. The dump site could be moved about 7 km landward in order to reduce the transportation cost.

REFERENCES

[1] CICT, Cai Lan International Container Terminal, https://www.cict.com.vn (accessed on 28/01/2018).

[2] CICT, Report on Environmental Impact Assessment due to the Dredging of Cai Lan International Container Terminal, Quang Ninh, Vietnam, 2011.

AN INVESTIGATION INTO MAKING SHIPS CLEANER AND MORE ENERGY EFFICIENT

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Keywords: environment, combustion, diesel engines,

ABSTRACT

"Naval-fx" consists of the development of a novel device (diffuser-receiver) with memory effect connected to the Internet and ready on board the ship which allows through the use of the already know quantum theory the molecular reorganization of the matter applied to marine fuels. The principles of quantum physics studied and interpreted and applied in the right way allow the establishment of an algorithmic relationship between the magnetic field information of the material (in this case the fuel) to be treated and a series of sound frequencies that are emitted from a server. It allows the aforementioned molecular reorganization of the treated matter and thereby a reduction in the emissions on board CO, CO_2, NO_x and SO_x among other advantages such as noise and vibrations reduction or longer engine life. This process has been called "Dynamization".

The main effect (based on molecular reorganization) is based on returning to atoms and molecules their original properties (before extraction, transport, refinement, etc.) through activation as explained above of their Magnetic field information. The phenomenon of activation of the system realized through computer algorithms will allow to instantly alter the magnetic information field of an atom and molecule or particle set at any distance without any loss of power made which surpasses all the electromagnetic and chemical systems employed today.

REFERENCES

[1] Berechman, J., Tseng, P-H. (2012). Estimating the environmental costs of port related emissions: The case of Kaohsiung. *Transport. Res. Part D* 17: 35–38.

[2] Corbett, J.J., Kohler, H. (2003). Updated emissions from ocean shipping. *J. Geophys. Res.* 108 (D20): 4650–4666.

[3] Corbett, J.J., Wang, C., Firestone, J. (2007). Allocation and forecasting of the global ship emission. In: *Proceedings of the Paper presented at Clean Air Task Force and Friends at the Earth International*, Boston, MA.

[4] Dalsoren, S.B., Eide, M.S., Endresen, O., Mjelde, A., Gravir, G., Isaksen, I.S.A. (2009). Update on emissions and environmental impacts from the international fleet of ships: the contribution from major ship types and ports. *Atmos. Chem. Phys.* 9: 2171–2194.

[5] De Meyer, P., Maes, F., Volckaer, A. (2008). Emissions from international shipping in the Belgian part of the North Sea and the Belgian seaports. *Atmos. Environ.* 42: 196–206.

[6] Dragovic, B., Tzannatos, E., Tselentis, V., Mestrovic, R., Skuric, M. (2015). Ship emissions and their externalities in cruise ports. *Transport. Res. Part D (in press).*

[7] Endresen, O., Sorgard, E., Bakke, J., Isaksen, I.S.A. (2004). Substantiation of a lower estimate for the bunker inventory: Comment on "Updated emissions from ocean shipping" by James J. Corbett and Horst W. Koehler. *J. Geophys. Res.* 109: D23302.

[8] Endresen, O., Sorgard, E., Behrens, H.L., Brett, P.O., Isaksen, I.S.A. (2007). A historical reconstruction of ships' fuel consumption and emissions. *J. Geophys. Res.* 112: D12301.

[9] Endresen, O., Sorgard, E., Sundet, J.K., Dalsoren, S.B., Isaksen, I.S.A., Berglen, T.F., Gravir, G. (2003). Emission from international sea transportation and environmental impact. *J. Geophys. Res.* 108 (D17): 4560, D17.

[10] ENTEC (2002). Quantification of emissions from ships associated with ship movements between ports in the European Community. UK: Report prepared for the European Commission.

[11] ESPO (2003). Environmental code of practice. ESPO, Brussels, Belgium.

[12] Eyring, V., Koehler, H.W., van Aardenne, J., Lauer, A. (2005). Emission from International Shipping: 1. The last 50 years. *J. Geophys. Res.* 110(D17305): D17305.

[13] IMO (2014). *Third IMO GHG Study 2014*. Micropress Printers, Suffolk, UK.

[14] Melo Rodríguez, G. de, Martin Alcaldea, E., Murcia-González, J.C., Saurí, S. Evaluating air emission inventories and indicators from cruise vessels at ports, WMU Journal of Maritime Affairs, Volume 16, Number 3, September 2017.

[15] McArthur, D.P., Osland, L. (2013). Ships in a city harbor: an economic valuation of atmospheric emissions. *Transport. Res. Part D* 21– 4752.

[16] Miola, A., Ciuffo, B., Giovine, E., Marra, M. (2010). Regulating air emissions from ships: the state of the art on methodologies, technologies and policy options. European Commission, JRC reference reports.

[17] Taylor, D.A. (1996). Introduction to marine engineering. Elsevier Ltd. UK

[18] Tzannatos, E. (2010b). Cost assessment of ship emission reduction methods at berth: the case of the Port of Piraeus, Greece. *Marit. Pol. Manage.* 37(4): 427–445.

ASSESSMENT OF MARINE DIESEL ENGINES PERFORMANCE BASED ON CARBON AND NITROGEN OXIDES CONTENT IN EXHAUST GASES

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Keywords: ship engines, nitrogen oxides, carbon, technical condition**.**

The widespread use of internal combustion engines operating on hydrocarbon fuels has led to significant environmental pollution and oxygen consumption. Exhaust gases contain a number of harmful compounds: incomplete combustion products and nitrogen oxides.

Analysis of the processes of fuel atomization, mixture formation and combustion in modern marine diesel engines with a jet (volumetric) method of mixture formation shows that the cause of the formation of incomplete combustion products is the uneven distribution of fuel and oxygen in the volume of the fuel jet with their subsequent heating. Insufficient amount of air inside the fuel jet leads to the formation of soot in the form of high-molecular substances, practically without hydrogen.

A sufficient amount of air on the surface of the fuel jets and the necessary temperature at the end of compression caused intensive combustion at temperatures up to 2500 K and higher which creates conditions for the oxidation of nitrogen. Nitrogen oxides also act as catalysts for the oxidation of sulfur to SO3 which forms sulfuric acid.

Our studies allowed to find out that as an indicator characterizing the patterns of formation of harmful substances it is necessary to apply not only the ratio of the surface area of fuel jets to the amount of fuel contained in them, but also the equivalent diameter of the fuel droplets (dотн):

$$c=f(BCD*dотн) \quad (1)$$

where B, C, D - are the groups of parameters characterizing the relative value of the diameter and number of nozzle openings in the atomizer, its flow coefficient, the average fuel pressure, the air charge state in the cylinder during the fuel supply, the physical properties of the fuel and its cyclic feed, the cone angle of the fuel jet (torch) and duration of ignition delay, fuel supply and combustion.

The processing of the experimental data in accordance with expression (1) showed a significant increase in the emission of harmful substances in proportion to the decrease in the index (BCD * dотн), i.e. as the technical condition of the engine deteriorates and the environmental conditions.

The regularity of the change in the NOx content also corresponds to (1).

REFERENCES

[1] Odintsov VI, Glazkov D.Yu., Sviridyuk N.V. Algorithm for modeling indicators characterizing the conditions for the safe operation of the diesel engines of the fishing fleet.// 5th International Baltic Sea Forum. Theses of reports. Part 1, p.152-154.

[2] The theory of internal combustion engines. Work processes. Ed. N.H. Dyachenko. L .: Shipbuilding, 1974. - 552 p.

[3] Camfer G.M. Processes of heat and mass transfer and evaporation during the mixture formation in diesel engines. M., Higher School, 1974. - 144 p.

[4] Brose D.D. Combustion in piston engines. M., Mechanical Engineering, 1969, - 248 p.

[5] Victor Odintsov. Working process of ship engines. Monograph, Kaliningrad, BHARF, 2010. - 135 p.

[6] Ivanov LA Heat stress and operational reliability of the cylinder-piston group of the marine diesel engine. Murmansk, Murmansk book publishing house, 1974. - 208 p.

[7] Vaskevich F.A. Increase of efficiency of operation of the main marine diesel engines by methods of regulation and diagnostics of fuel equipment. // dis. Doctor of Technical Sciences, St. Petersburg, 2006. - 267 p.

[8] Odintsov VI, Glazkov D.Yu. Provision of conditions for safe operation of marine ICE by limiting emissions of incomplete combustion products. // Bulletin of the Astrakhan State Technical University, ser. "Marine Engineering and Technology", Astrakhan, No. 4, 2016, - p. 70-76.

[9] Lyshevsky A.S. Spraying of fuel in marine diesel engines. L., Shipbuilding, 1971. - 248 p.

[10] Odintsov VI, Glazkov D.Yu. Some patterns of soot formation in ship engines. // Bulletin of the Astrakhan State Technical University, ser. "Marine Engineering and Technology", Astrakhan, No. 3, 2014, - p. 83-88.

[11] Ship's documentation

THE REPELLING EFFECT OF GOLDEN APPLE SNAIL *(Pomacea canaliculata)* EGG EXTRACT ON ALGAE

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Abstract

There is an ongoing search for an alternative way to repel algae that is environmentally-friendly, thus, this study was conducted. This study aimed to determine the repelling effect of golden apple snail (*Pomacea canaliculata*) egg extract on algae. Pure natural extract of golden apple snail eggs was taken and mixed with ordinary paint in different concentrations. Five metal sheets with three replicates for a total of 15 metal sheets in each block were prepared and painted with treatments. The metal sheets were distributed randomly in each of the three blocks and were exposed to the sea at an average depth of two meters for four days. Randomized complete block design (RCBD) was utilized as a research design of the study. Treatment B (50% golden apple snail egg and 50% ordinary paint) was the toxic treatment tested during toxicity testing. Treatment A (80% golden apple snail egg and 20% ordinary paint) had the least mean weight of 0.10 g of attached algae while Treatment E (100% ordinary paint) had the greatest mean weight of 0.94 g of attached algae. Block 2 (Villa Beach) had the least mean weight of attached algae on metal sheets after four days of sea exposure with a mean weight of 0.20 g for descriptive data analysis. For inferential data analysis, there were significant differences in the mean weight of attached algae after applying with various treatments and blocks for four days. Result showed that Treatment A (80% golden apple snail egg and 20% ordinary paint), Treatment B (20% golden apple snail egg and 80% ordinary paint), and Treatment D (100% antifouling paint 2) were the best treatments and Block 2 (Villa Beach) was the block with the least mean weight of attached algae. In conclusion, Treatment A (80% golden apple snail egg and 20% ordinary paint), Treatment B (20% golden apple snail egg and 80% ordinary paint), and Treatment D (100% antifouling paint 2) when compared to antifouling paint were the best treatments as an antifouling agent to algae because it had the least mean weights of attached algae and Dreon et al. (2013) includes the presence of ovorubin and PcPV2 which were protein and toxin found on golden apple snail eggs. These two contributed to the repelling effect that made Treatment A (80% golden apple snail egg and 20% ordinary paint), Treatment B (20% golden apple snail egg and 80% ordinary paint), and Treatment D (100% antifouling paint 2) as the best among the five treatments.

Keywords: golden apple snail, antifouling, blocks, algae, ovorubin, PcPV2

REFERENCES

[1] V. Gopikrishnan, M. Radhakrishnan, R. Pazhanimurugan, T. Shanmugasundaram, and R. Balagurunathan, "Natural products: Potentials and less explored source for antifouling compounds", Journal of Chemical and Pharmaceutical Research*, Vol. 7*(7), pp. 1144-1153, (2015).

[2] J. Marechal and C. Hellio, "Challenges for the development of new non-toxic antifouling solutions", International Journal of Molecular Sciences*, Vol. 10*(11), pp. 4623-4637, (2009).

Maritime Policies and Issues

ADOPTION OF KPI'S IN MODERN SHIP MANAGEMENT ON EXAMPLE OF POLISH OFFSHORE INDUSTRY

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Keywords: KPI, BIMCO, shipmanagement, offshore industry, IAMU 2018

The shipping KPI systems is build up hierarchical with 7 Shipping Performance Indexes (SPIs), 34 Key Performance Indicators (KPIs) and 66 Performance Indicators (PIs). Shipping Performance Indicators give external information in following areas: environmental performance, health and safety management and performance, HR management performance, navigational safety performance, operational performance, security performance, technical performance. The objectives of KPI are to: measure for continuous improvement, measure for internal and external benchmarketing, measure to set incentives. Couple of years of experts (InterManager, The Research Council of Norway and Marinetech) work are fruitful in establishing of Shipping KPIs, which is distributed between BIMCO members. Last year Polish offshore industry start to be interested in incorporating BIMCO Shipping KPIs standards in own ship management. Specific of offshore vessels was difficult to compare with other vessel type (cargo). This is why were established an innovate system of KPIs. Especially adopted to local needs. Authors present their approach to questions of creating new, consolidated KPI. Especial interests of offshore business company managers in material interests of crew performance. It is really complicated to measure some shipping segments. Ph.D. thesis are actually under construction and within few months will be completed.

Papers contains 12 pictures, 4 diagrams, 2 tables and several photos.

Authors want their abstract to be selected for The Conference Proceedings.

References:

[1] Laczynski Bogumil, Laczynski Tomasz, “Recent Developments in International Maritime Education and Training - Enhancing the Productivity, Safety and Energy Efficiency in Maritime Transport “, IAMU AGA 15, IAMU Proceedings

[2] Laczynski Bogumil, “The Impact of Shipping Company Environment Industry to Extend Studies at the Faculty of Navigation in Gdynia Maritime University”, 11th INTERNATIONAL CONFERENCE TRANSNAV 2015 ON MARINE NAVIGATION AND SAFETY OF SEA TRANSPORTATION, Gdynia, Poland 2015

[3] Laczynski. B., Laczynski. T., “Characteristic of post-degree courses organized in GMU on example “MODERN SHIP MANAGEMENT” course”, Proceedings of International Conference of International Association of Maritime Universities (IAMU) AGA 2016, 26-29 October 2016, Haiphong, Vietnam

RISK ANALYSIS FOR MEDICAL TREATMENT ON BOARD

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Keywords: Seafarer, Health, Risk Assessment

Maritime profession, due to the diversity of risks involved and harshness of work conditions, is acknowledged to be among the most dangerous professions in the world. Seafarers are mandated to spend their work hours and their leisure time saved for relaxing at the end of work day in the very same environment -the ship-. This reality shows that in their work and leisure hours alike seafarers are exposed to a myriad of hazards and risks. Seafarers face to serious and hazardous conditions such as adverse weather and dangerous sea conditions, hazards related with the operation of mechanical equipment, toxic cargoes and substances used on-board. Many factors combine together to affect the health of seafarers, including fatigue, long working hours, working at times of low alertness, prolonged work, insufficient rest between work periods, excessive workload, noise and vibration, motion, dehydration, medical conditions and acute illnesses. In addition, being separated from family and friends and often spending long periods away from home may experience negative health consequences to the individuals. Maritime-related professional environments can potentially make the work pattern harder when compared to work on land-based working environment. The situation in itself, that the work is done at sea far away from medical services, rescue services or police services in an emergency contribute to a challenging environment onboard. An accident that occurs at sea may be attended with the most serious consequences than it would happen on land. Providing emergency medical treatment onboard ships at sea can be difficult due to the limited available medical resources and competence of on board medical personnel. For this reason, even minor ones can cause bigger problems. In this study, a comparative risk assessment about medical situations on board will be carried out by considering Turkish tele-health center database about medical emergency calls from ships around service area. Finally, preventive measures which will reduce health related risks on board will be proposed.

REFERENCES

[1] S. Kairis Seafarer′s Health & Lifestyle, 2012. Available at: ⟨http://officerofthewatch).

[2] MSA-231. The list of Designated Hospitals and Duly Qualified Medical Practitioners for Seafarers' Medical Examination, 2012. Available at: ⟨http://www.msa.gov.cn/ Notice/Notice/80a10d08-f63c-4a32-a53e-e4adc7dde5df⟩ (Accessed 19 March 2013).

[3] International Medical Guide for ships. 3rd Edition. WHO, Geneva, 2007.

STATE OF AMERICA'S MARINE HIGHWAY PROGRAM

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ABSTRACT

This paper presents a synopsis of the establishment and structure of America's Marine Highway Program (the program) followed by an in-depth analysis of the program with a focus on possible reasons the program is not meeting initial expectations, not providing the country with the degree of benefits that the designers and planners of the program had envisioned, and not being utilized to its potential capacity. The paper presents possible solutions that might increase the use of short sea shipping in the United States such that America's marine highways can become the program for which it was conceived.

Following an introduction and brief discussion of the importance of waterborne transportation throughout America's history, the paper addresses the current situation of domestic landside transportation of cargo in the United States, specifically identifying the problems that have developed over time as the result of the increasing movement of container freight via landside highway routes, such as increasing levels of traffic congestion and noise, highway infrastructure deterioration, fuel consumption, carbon emissions, and highway accidents and fatalities. This section also describes the current situation of the use of marine highways in the United States, to include a discussion of the areas of the country where short sea shipping is being used effectively.

The second section of the paper discusses the establishment of America's Marine Highway Program, the intent of the program, and its potential benefits. The paper addresses that the program would support America's shipbuilding industry, supplement America's strategic sealift assets, and create jobs in the maritime industry.

The third section of the paper provides analysis of some of the reasons America's Marine Highway Program has not lived up to expectations. The reasons are many and varied, including unfortunate timing, old habits, current regulations, lack of awareness, reluctance of shippers to commit to a different mode of transportation, higher and additional costs, unreliable and slow service, shortage of container ships, and sufficient supply of trucks to handle the current demand.

The fourth section of the paper addresses the short sea shipping situation in Europe to include its history, successes, and programs designed to encourage shipping on waterways. This section includes comparisons between Europe's short sea shipping and America's Marine Highway Program.

The paper concludes with some recommendations on actions and policy changes that may help reinvigorate America's Marine Highway Program, such as additional government incentives, waivers of regulations, increased promotion and marketing, and changes to the structure of taxes assessed on goods moving via waterborne routes. With a concerted effort by public and private entities, it is not too late to save America's Marine Highway Program.

Ports and Terminal Management

CHALLENGES AND OPPORTUNITIES FOR ENHANCING PORT COMPETITIVENESS IN AFRICA

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Keywords: Resources, Role of African ports, pivotal zones, emerging ports, challenges, opportunities, global cooperation, Investments

ABSTRACT

Throughout the Eras , Africa is considered to be one of the most important economic treasures which was never well utilized. despite the great potentials that qualify Africa to become an important and effective element in the global trade exchange . However the significant growth in African gross domestic product (GDP) and the developments in the maritime and logistics industry could give us a very good indicators towards a promising future, there are many integrated strategies must be taken in consideration to achieve effective investments in such sector .[1,2]

The research aims to highlight important elements that help to study the prospects of developing the maritime industry and logistics in Africa such as: the readiness of Africa to receive global investments in the maritime transport and logistics sector, the qualification of Africa to enter the era of smart ports, the eligibility of Africa for the sustainable development, the effect of the flow of investment on the change in maritime transport legislation in the continent, the scope of cooperation with African maritime sector specially with Europe Asia.

The research studies the importance and effectiveness of the below mentioned pivotal areas on which Africa relies as a cornerstone points for its trade exchange which are mainly Suez Canal (Egypt), Tangier-Med (Morocco), and Port of Durban (South Africa). as well as The Emerging Ports Such as Lome (Togo) Djibouti (Djibouti) Mombasa(Kenya), Abidjan (Côte d'Ivoire) , Tema (Ghana), Douala (Cameroon), Lagos (Nigeria), Dakar (Senegal), and Lome (Togo) ,in addition to study the human recourses , infrastructure, legislations and opportunities for sustainable development as well as information technology ,as an important factors in for identifying the challenges and opportunities for investment and development [3, 4]

The main methodology of the research depends on a (SWOT) analysis to identify the opportunities and challenges in addition to the threats which effect the future strategies of development and investments in Africa as shown in fig. 1 [5,6].

As a result the research highlights the opportunities for global maritime and transport investment towards putting Africa firmly on the international maritime map as well as challenges facing the development and integration of ports and logistics in Africa

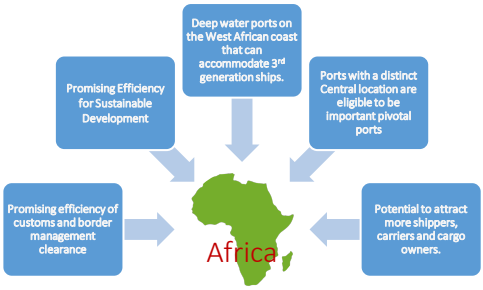

Fig.1 SWOT Analysis "Strength"

Based on the research outputs we could conclude that Africa maritime and logistics sector is encouraging to play a significant role in handling logistics activities associated with international trade. Thus, cooperation in improving the efficiency of shipping and related logistics activities besides developing the human resources through capacity building and establishment of a job skills guide line that based on the global stander can have a positive and significant influence in boosting trade flows. *[7]*

Global investments for a good shipping service with regular trade vessels, particularly container carriers, is highly needed as promising opportunity for the investors and economic entities in the field of maritime and logistics industry

REFERENCES

[1] Vaggeryd terminal website (2015) .Vaggeryd logistic Center. www.vaggerydlogcentre.se

[2] Yeo, G.T., M. Roe, and J. Dinwoodie. 2011. Measuring the competitiveness of container ports: logisticians' perspectives.

[3] Consequences of Port Congestion on Logistics and Supply Chain in African Ports ISSN 2224-607X (Paper) ISSN 2225-0565

[4] Assessment of Port Efficiency in West Africa Using Data Envelopment Analysis, George Kobina van Dyck, March 2015

[5] Tongzon, J., and L. Sawant. 2008. Port choice in a competitive environment: from the shipping lines' perspective. Applied Economics 39: 477–492.

[6] M.Kourouma (2015). The case of transport and trade facilitation in East Africa. Challenges and the way forward. Workshop paper .UNECA / SRO-EA.Dares Salaam Tanzania.

[7] World Bank (2014) .Countries' economic outlook. www.worldbank.orgWorld Bank (2014) .Countries' economic outlook. www.worldbank.org

[8] The Attractiveness of Ports in West Africa: Some Lessons from Shipping Lines' Port Selection, April 2016 https://www.researchgate.net/publication/282450061_The_Attractiveness_of_Ports_in_West_Africa_Some_Lessons_from_Shipping_Lines'_Port_Selection

[9] 9. UNCTAD. 2012. Best practices in investment for development: How to utilize FDI to improve transport infrastructure in ports.

CONTAINERSHIP BAY TIME AND CRANE PRODUCTIVITY: ARE THEY ON THE PATH OF CONVERGENCE?

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Keywords: Containership bay time, gantry crane productivity, stowing plan, beam size, port time, berth time

THEME: A

ABSTRACT

Containerships are getting bigger and bigger. Their time at the pier for discharge and load (D&L) of containers is increasing due to their larger bays (Yahalom, 2016). A key factor in bay time is the D&L of gantry crane productivity (lifts per hour).

The objective of terminal operators and shipping lines is to minimize containership berth time, defined as the time between vessel berthing and un-berthing. Berth time is derived from bay time, defined as the amount of time it takes to D&L the largest fully loaded bay of a containership (B_{it}) in hours. Bay time is the dominating factor of completing the D&L of a containership. Bay-time is determined by bay size which is two times container storage capacity for D&L ($2B_{ic}$) and gentry crane productivity (lifts per hour) (P) (Yahalom, 2016) (Equation 1).

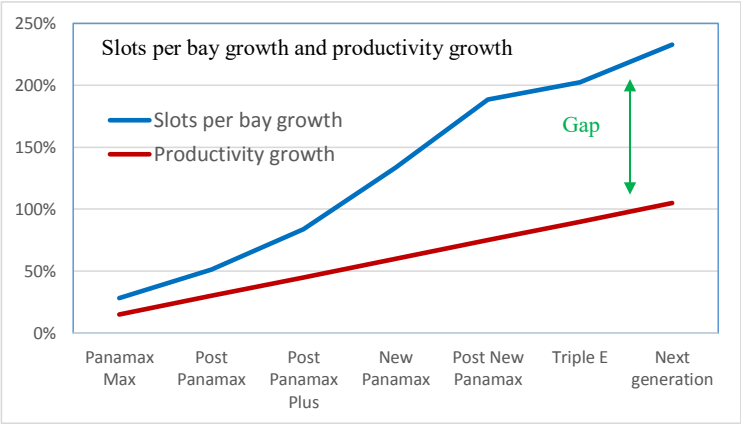
$$B_{it} = \frac{2B_{ic}}{P} \quad (1)$$

Bay size and crane productivity have been changing with the increase in containership beam size and advances in crane technology. Therefore, equation 2, derived from Equation 1, is the percentage change in each of variables in Equation 1 and is the foundation for the determination of the relationship between bay time, crane productivity and their implications.

$$log\, B_{it} = log\, 2B_{ic} - log\, P \quad (2)$$

Productivity growth and container slot per bay growth are an industry fact. But what is less clear is their timing and their adjusting lag. Therefore, the focus is on the trends and the general magnitude of the gap (Figure below). Even though both the timing of the adjustment of the lag and to some degree the magnitude of the figures might be off when compared to each other, their size and their persistent growing gap are evident and were the cause of taking action to close the gap by the port industry and to a lesser degree by the container shipping industry.

To determine this relationship the paper uses lifts per hour as a standardized measure of comparison and for quantifying this relationship. This important measure highlights the extent of the problem and the pressure it imposes on the container port and on the containership owner and operator. The pressure on the Owner/operator is somewhat reduced by resorting to the inefficient call of a large number of ports and by using creative stowing plans for each port. The pressure on the ports is to improve productivity and output at the berth. Improved port performance in the long run is the key for a port to stay in business and be competitive.



The paper finds that the diseconomies of scale associated with increase in containership beam size measured by productivity are substantial and increasing. The paper also finds that the gap between the two is adjusting with a lag but the gap reached a level of non-convergence. Therefore, there is a need for external measures to stabilize port performance whereby output growth matches bay size growth. Stabilizing this relationship also requires a large number of gantry cranes. Some improvements in the short term could be offset by stowing planners taking into consideration the limitations of each container port along the multiple ports of call of the liner service. These limitations could include a larger number of gantry cranes assigned per vessel. The stowing plan might also require stowing containers in non-adjacent bays and/or avoiding a high concentration of cargo for the same port in one bay. Creative stowing planning could provide some of the reduced bay-time benefits at the cost of multiple ports of call and their inefficiencies.

The paper also finds that in the long run the large containerships need for technology improvements is in two distinct areas: increase use of spreaders that can D&L multiple containers in every lift and install a "Fastnet" or similar technology. Spreaders that handle multiple containers are a relatively inexpensive method added to existing equipment. Many ports utilize the technology already. The "Fastnet" technology is a large undertaking with significant implications for terminal performance and a large investment. The ultimate combining of these two technologies might even eliminate the diseconomies of scale in the port due to the increase in containership beam size.

The paper finds that a comparison (ratio) between productivity (lifts per hour) and output (moves per hour) is instrumental in determining port efficiency improvement over time. This captures the improvements from two aspects where the first is the foundation for the improvements.

In addition, the improvement of container terminal performance also requires container terminals to have a sufficient number of cranes, large yards, and equipment to move containers around, trained individuals, and more. These issues are beyond the scope of this paper.

The research highlights container terminal operations, indicating the long-term objectives for container terminal needs and the ability to stay or be competitive. It could also be used for bay time planning, berth time planning, stowage planning, and berth time guarantees during negotiations. The findings could also be used for berth planning, prioritizing berth and port development and investments. Furthermore, the evaluation method could also be used in determining containership development and its impact on berth time.

REFERENCES

Yahalom, Shmuel, and Changqian Guan (2016): **Containership Port Time: The Bay Time Factor**, *Maritime Economics & Logistics*, ISSN: 1388-1973, December, pp 1-17, online: September 12, 2016 (DOI: 10.1057/s41278-016-0044-6).

OPEN-BERTH STRUCTURES' BED ROCK EROSION PROTECTION SYSTEM FROM MAIN PROPELLER ACTION: CASE STUDY IN VIETNAM

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Abstract:

The ship main propeller action is the one of biggest erosion impacts to the bed rock protection of the berths in general, especially in the open-berth structures. In the current trend, the ship size and deadweight are getting bigger and bigger leading to increase the ship power. That makes the erosion by the main propeller on the rock protection system faster and more intense. These negative effects can impact considerably on the open-berth structure.

In the recent decades, erosion protection solutions considering the main propeller action (e.g. rock fill, instu concrete, performance mattress, etc.) have been researched and presented. These protection methods have been applied at many ports in the world and achieved the positive results.

Vietnam, an ocean country with the long coastal line of 3,260 km and 40 seaports is also located at the one of busiest shipping lines in the world. According to the national economic development in recent years, key ports will be expanded and a large number of new ports have been being promptly built. Among the common used berth structures, as being suitable for the geological conditions and the construction technique in Vietnam, open-berth structures are being applied for ports most popularly. However, the design and calculation methods of the bed rock protection currently used in Vietnam haven't considered the main propeller action yet, i.e. only considering effects of waves and current.

The paper discusses the advantages and disadvantages of bed rock protection methods and their feasible application in the conditions of Vietnam. As the result, the most effective and appropriate solution for the open-berth structures' rock erosion protection considering the main propeller action will be proposed. An erosion protection design considering the main propeller action of a seaport in Vietnam will be also presented in the paper.

Keywords: ship main propeller action, erosion, bed rock protection, open-berth structure.

REFERENCES:

[1] TCVN 207:92, Design of Sea Port, Vietnamese Standards, 1992;

[2] Carl A. Thoresen, Port Designer's Handbook, Institution of Civil Engineers, 3rd edition, 2014;

[3] PIANC, The World Association of Waterborne Transport Infrastructure, Technical Report 2014;

[4] EAU 2004, Recommendations of the Committee for Waterfront Structures: Harbours and Waterways, 8th Edition, 2004;

[5] J.G. de Gijt & M.L. Broeken, Quay Walls, CRC Press, 2nd edition, 2014.

SHIP MANOEUVRE ANALYSIS AND SIMULATION TO OBTAIN SCOURING RELATED PROPELLER VARIABLES

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Keywords: AIS data, ship trajectory monitoring, ship simulator, scouring action, propeller generated erosion.

ABSTRACT

The evolution of shipping industry in terms of bigger and more powerful ships, is causing several issues in existing ports and marinas designed, initially, to host smaller vessels with smaller propulsion systems and lower drafts, such as harbour basin erosion near quay walls, deposited zones in low frequented areas and reduction of draught in operational areas. The erosion of port sediment in which quays and other structures are settled is leading to structural problems caused by scouring action and navigational problems due to sediment transport and relocation. Previous studies concluded that main problems come from regular vessels (excepting tugboats and pilot vessels) such as ferries, which dock and undock frequently in the same quays performing the same manoeuvres. Moreover, ferry ships require a particular quay to allow their ramping systems to be used during port operations, which is parallel to the propeller plane, so it is perpendicularly affected by main propellers generated thrust during docking and undocking manoeuvres.

This problem has been approached in engineering by several authors over the last decades, mainly through laboratory studies considering mostly one single propeller ([1]–[5]), with more recent research using twin propeller generated streams ([6]). They consider different combinations of the main propellers characteristics such as rotational velocity, pitch, blade projected area, etc., to obtain the size and location of the generated scour depending on the propeller behaviour. However, the real value of these variables, in particular rotational velocity and pitch, are mostly unknown by harbour authorities and researchers. The study of the manoeuvre, obtained through AIS data analysis ([7]–[9]), and its reproduction by means of a full mission bridge simulator can be used to obtain the evolution of parameters directly related with the scouring action.

This contribution deals with a method to reproduce real ship manoeuvres in a full mission ship simulator starting from AIS data analysis from a concrete study case. A faithful reproduction permits to extract variables such as rotational velocity, engine power and propeller pitch, which, in turn, allow the study of the scouring action using literature formulae. Once the engine and propeller behaviour variables are obtained and related to the geographical position of the ship during the maneuver, the points of maximum forcing can be located, giving the port authorities a clue about the most probably affected area so that they can arrange prevention and protection actions.

Results obtained show that AIS data can be used to obtain manoeuvring patterns to later mimic the ship behaviour on the numerical simulator. The use of AIS information as input data at the simulator, yields

real maneuvring variables allowing the study of the scouring action for every particular case depending on vessel type, maneuver or met-ocean conditions.

REFERENCES

[1] PIANC, *Guidelines for protecting berthing structures from scour caused by ships. Report n° 180*. The World Association for Waterborne Transportation Infrastructure, 2015.

[2] D. P. J. Stewart, "Characteristics of a ship's screw wash and the influence of quay wall proximity," *Dr. Diss. Queen's Univ. Belfast*, 1992.

[3] D. Ryan and G. a. Hamill, "Determining Propeller Erosion at the Stern of a Berthing Ship," *J. Waterw. Port, Coastal, Ocean Eng.*, no. August, p. 104, 2012.

[4] G. Hamill, "The scouring action of the propeller jet produced by a slowly manoeuvring ship," *Bull. Perm. Int. Assoc. Navig. Congr.*, vol. 62, 1988.

[5] G. Hamill, H. T. Johnston, and D. Stewart, "Propeller Wash Scour Near Quay Walls," *J. Waterw. Port, Coast. Ocean Eng.*, vol. 125, no. 4, pp. 170–175, 1999.

[6] A. Mujal-Colilles, X. Gironella, A. Jaquet, R. Gomez-Gesteira, and A. Sanchez-Arcilla, "Study of the Efflux Velocity Induced By Two Propellers," in *SCACR, Conference on Applied Coastal Research*, 2015.

[7] M. Castells, F. X. M. De Osés, A. Martín, and X. Gironella, "Tools for evaluation quay toe scouring induced by vessel propellers in harbour basins during the docking and undocking manoeuvring," *Mar. Navig. Saf. Sea Transp. 61-66.*, 2017.

[8] K. Gunnar Aarsæther and T. Moan, "Estimating navigation patterns from AIS," *J. Navig.*, vol. 62, no. 4, pp. 587–607, 2009.

[9] K. G. Aarsæther and T. Moan, "Computer vision and ship traffic analysis: Inferring maneuver patterns from the automatic identification system," *Mar. Navig. Saf. Sea Transp.*, vol. 4, no. 3, pp. 303–308, 2009.

Role of women in the maritime industries

BARRIERS TO WOMEN'S LEADERSHIP IN MARITIME AND THE WAYS TO OVERCOME THEM

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Keywords: Women's Leadership, Networking, Virtual Mentoring, Authentic Leadership

MARITIME WOMEN LEADERSHIP

Leadership is the art of motivating a group of people to act towards achieving a common goal. The leader is the inspirer and director of the action. He or she is the person in the group that possesses the combination of personality and leadership skills that make others want to follow his or her direction [1]. Theoretically, men and women have the same rights, may have almost the same education and more or less the same traits. That means they have the same chance to be leaders, but this is not the case in practice.

Maritime is a male-dominated sector and as in all male-dominated sectors, women working in maritime jobs face some problems deriving from not only the special nature of the jobs but also the hardships they face because of the bias against them in this sector. There are very few women leaders in maritime due to these reasons and this fact deprives the sector, which is in need of a lot of qualified staff, of the positive contributions women can make. That's why some precautions should be taken to eliminate those barriers in order to enhance women's participation and leadership in the sector and give women the place they have already deserved.

Barriers for women in maritime

The data used in this study was collected through a survey and a workshop. Upon evaluation of the data, the causes of problems encountered by women in maritime have been identified. These problems can be grouped under three headings, which are: Problems of Disapproval by Men, Problems Deriving from Lack of Guidance and Problems Related to Acquiring Leadership Skills. Drawing upon the information obtained from the responses given to the statements in each group, most suitable ways to increase effectiveness and the number of women in maritime are discussed.

The responses given to the statements in the first group show that maritime is still seen as a men's job as it has always been seen in the past. There is a strong prejudice against women in maritime, especially on board ships. Because of this, it is hard for women to find appointments there. Those biased against women include ship owners too, and this makes the situation even worse by decreasing their chances of finding a job on board. The data shows that being able to find a job on board a ship is not the end of their problems, but just the beginning. Responses to the second group prove that women in the maritime sector, especially those working on board, are in need of guidance and friendship. Maritime jobs are hard and demanding even for men, who constitute the majority of the personnel on board. There is usually a strong communication

among them, so if they have a problem they will share it with each other or if they need help they can easily ask for it from their co-workers. On the other hand, for a woman who already feels lonely because of strong prejudice, it is hard to ask for help or to expect any kind of support from men who are mostly against her presence on board. Responses in the third group show that almost all the attitudes of male personnel have negative implications for them. Although men don't confess it, it is understood from the way they act, speak, think and judge that causes women to work harder to prove themselves and to get the positions they deserve.

Suggested ways to overcome the barriers

It is clear that some measures should be taken, and a novel strategy should be adapted to overcome these hardships and to enhance women's leadership qualities, which will hopefully increase the number of women struggling for leadership positions in maritime. Drawing from the survey we administered and taking the suggestions made by the workshop attendees into consideration, we think that two styles can work for women in maritime. These are providing female cadets and staff with effective networks and mentors, and emphasizing authentic leadership qualities in them.

CONCLUSION

Like all working women, women in maritime have some problems. These problems are doubled because of working in a male dominated work place and tripled because of being at sea. To cope with them, women need some activities such as networking and virtual mentoring and they need to behave like their true selves, that is, authentically. Access to influential networks is critical to moving up the leadership hierarchy. Some studies have found that the social capital gained from networking with influential leaders is even more important for advancement than job performance. Mentoring and virtual mentoring are two ways to enable women in maritime to counsel and get help from experienced people and bear the hardships they face, which also proved to be useful in breaking barriers to leadership. [2] These will enable them to interact with people from the sector and make their voice heard, and will also help men to have a chance to get to know the women in the sector so that they may appreciate their competence.[3] Women should make use of their traits to the full extent in their interaction with people. Being like themselves and acting naturally will make them authentic and carry them to leadership positions. Authentic leadership is accepted as the best leadership style for women. It shouldn’t be forgotten that while women realize themselves and take out the potential they have for the good of the maritime, maritime will be the party that will benefit from the situation the most, because women are the other half of society and without them, like everything else, maritime will also be incomplete.

REFERENCES

[1] What is Leadership? [viewed 2018-03-07]. Available from the Internet: https://www.thebalance.com/leadership-definition-2948275

[2] Barriers and Bias, The Status of Women in Leadership. 2016. The American Association of University Women [viewed 2018-03-10]. Available from the Internet: https://www.aauw.org/research/barriers-and-bias/

[3] The Qualities That Distinguish Women Leaders, [viewed 2018-05-10]. Available from the Internet: http://www.calipermedia.calipercorp.com/whitepapers/us/Qualities-in-Women-Leaders.pdf

HELM'S WOMAN – RELIGIOUS, SOCIAL AND CULTURAL BARRIERS

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Keywords: "#MeToo" woman, gender equality, empowerment, Barriers, seafaring profession.

ABSTRACT

Woman has always been a source of love, beauty, aspiration, inspiration, respect, wisdom, generosity, humbleness, curiosity, complicity, accomplishment and sacrifice. She is affectionate, radiant, vibrant, strong, and full of life. She is a multidimensional aspiring gender being daughter, sister, mother and wife. Creation of men and women and gender equality has different connotation and concepts in different religions, cultures and societies. Mostly out of context and misquoted concepts about woman by followers of different religions. As Islam is quoted suppressor of woman but in reality, it advocates gender equality and women rights. Similarly, different cultures have different set standards for women's role in society. In Hindu culture, girl is considered a big burden on family because of dowry. In Sweden, priority is children, women and men.

Theoretically, the whole world is emphasizing gender equality. UNO (UNICEF General Action Plan (GAP) 2018-2021) [1] is promoting gender equality by elaborating women empowerment and eliminating discrimination. UNDP Human Development Report Office's (HDRO) five key issues [2] like "Human Development Index (HDI), The Inequality - Adjusted Human Development Index (IHDI), the Gender Development Index (GDI), the Gender Inequality Index (GII) and Multidimensional Poverty Index (MPI)" indicate the importance of gender equality and women empowerment. Norway standing at the top with 0.949 in HDI, Central African Republic at the bottom with ranking 188 with 0.352 and Kingdom of Saudi Arabia at 38 with 0.847. GDI and GII contributes very high weightage in HDR [3]. (Although in the case of KSA, there are some reservations about calculation of these two inputs).

Women empowerment has become an international agenda, but in reality, it portrays very disappointing picture. Everyone praising woman and not ready to let her exercise her freedom. It is the case with the maritime industry, very loud voices from all quarters to empower women but with least progress. World cannot afford half of the population stagnate and paralyzed. "Men/women ratio is estimated to be 1.017:1 with male population 3,776,294,273, while the female population 3,710,295,643" [4] with some diversion at different age levels and country wise, like India, for example, male children are preferred, and female births often aborted. As a

result, it is predicted that men will outnumber women by 2030. However, with least difference, overall men and women population is equal. There is no doubt that at present, women are leading the nations, commanding war and merchant ships, flying aero plans, and working in “hard-job” areas. However, are we rational in appreciating woman abilities? A study shows that a woman needs to make another degree to earn the same salary of man. “In USA, during 2017, on average, women with a master’s degree earned $83,000 whereas men with bachelor’s degree earned: $87,000. [5]

In nutshell, there are social cultural and religious barriers for working woman, especially in demanding seafaring profession. This paper has addressed many issues related to women empowerment and acceptability. It has emphasized woman’s readiness to expose herself to seafaring hardship, employment opportunities while qualified male seafarers are unemployed. It has also stressed upon maritime institute’s readiness for women training, acceptance by conservative societies to accept her as helm’s woman, working conditions, harassment and sexual abuse. “Women serving in the U.S. Marine Corps and the Navy are at a higher risk of being sexually assaulted. Almost three times as likely as their Air Force counterparts to be victims of sex crimes, according to a new Pentagon report.” [6]. "#MeToo" is obvious to look into this issue.

Two different cultures, Saudi Arabia and Japan have been studied and analyzed to draw a conclusion that how different cultures, religions and societies perceive the status of working woman and to create a safe working environment in the seafaring profession.

REFERENCES

[1]. UNICEF Gender Action Plan, 2018–2021, 13 July 2017, United Nations, Retrieved on 2nd March 2018, https://www.unicef.org/gender/files/2018-2021-Gender_Action_Plan-Rev.1.pdf

[2]. http://hdr.undp.org/en/countriesretrieved on 2nd March 2018,

[3].https://en.wikipedia.org/wiki/List_of_countries_by_Human_Development_Index retrieved on 2nd March 2018

[4].https://www.reference.com/world-view/ratio-men-women-world-population-5afd68eb596fbafb retrieved on 2nd March 2018

[5].https://moneyish.com/ish/to-make-the-same-salary-women-have-to-earn-one-more-degree-than-men/ retrieved on 10 March 2018

[6].https://www.military.com/daily-news/2014/12/04/study-female-marines-sailors-at-higher-risk-of-sexual-assault.html retrieved on 12 March 2018

HOW CAN WOMEN BE ENCOURAGED TO WORK IN MARITIME PROFESSIONS? - POSSIBILITIES FOR FLEXIBLE POST-GRADUATE STUDIES

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Keywords: women, maritime industry, education & training

INTRODUCTION

Maritime industry has traditionally been strongly dominated by men. Accordingly International Transport Worker´s Federation world´s maritime workforce still consist only 2% of women. There is need to improve this statistics and encourage women to build maritime career alongside with men, both at sea and on shipping related professions. Many prejudices and a lack of awareness about working in the field of shipping can affect women´s willingness to seek into work places maritime sector. There can be many limiting issues for women, for instance many maritime related jobs ashore require experience from sea. (1) Not all possible professions available in maritime industry may be obvious for a young female who is making her career plans. A function of the socio-economic climate and social culture within different state have an influence to the seafarer manpower requirements. This can lead to diverse requirements for access into different shore-based sectors and seafarer have difficult to enter these positions due to the qualification level required. (2)

Promoting maritime professions

Agenda of several international organisations, governmental agencies and private organisations have been to promote the progress of women in maritime sector during the several decades. In order to attract women in the industry, also schools and educational institutions should have policies to help women understand and know about maritime professions. There is need for improvement of career awareness and preparedness. Planning of the future studies and profession start in early stage and young people need to have sufficient information and knowledge enough about different possibilities developing their careers before high school or college level, so that they are able to choose and concentrate on wanted courses in good time. For example in Finland, some high schools are offering advanced maritime courses in their curriculums.

Study about women´s career in marine professions

This paper presents a survey conducted about women´s role in maritime professions and career possibilities, using both experiences of students of Master programme in Maritime Management in Satakunta University of Applied Sciences and interviews of graduated bachelor and master alumni's from the same University. This paper describes the current situation about the women´s interest to seek their way to the maritime industry as well as presents possibilities how women can be encouraged to plan their career path first at sea on vessels and later on, how can they make good use their valuable work experience at sea in shore-based organizations.

In this study the reasons for aluminis seeking into maritime profession are mostly explained by family´s sea going careers and traditions. Also a general interest towards maritime profession affects on willingness to seek the profession of the seafaring. Results of the survey relieved that the reasons for further studies for women interviewed were inclination to self-development and improving their career possibilities in labour market.

Post-graduate studies

This article introduces the post-graduate studies that take into account student´s sea going experience and can be accomplished at the same time when working and can support the progress of personal career.

This Master programme has been especially tailored to meet women's demand for a work in a land-based organization. Approximately 10 per cent of the graduates are women which is a lot more than women in general in maritime profession. The statistic survey reveals which has been conducted that the motivation among women students in master programme is higher and percentage of graduating students is especially high. Flexibility of the study programme has especially benefited women´s participation and fast graduation. Reasons for this will be reported in the article and more closely surveyed in the interviews.

REFERENCES

1. Grant, Claudia Grant and Vivette. Women in the Maritime Sector: Surviving and Thriving in a Man´s World - A Caribbean Perspective. [book auth.] WMU. [ed.] Momoko Kitada, Erin Williams and Lisa Loloma Froholdt. *Maritime Women: Global Leadership.* New York Dordrecht London : Springer-Verlag Berlin Heidelberg, 2015, Vol. 3, p. 90.

2. European Communityof Shipowners Association & European Transport Worker´s Federation**.** *The mapping of career paths in the maritime industry.* pp. 148-150.

THE EVOLUTION OF FEMALE FIGURES IN MET INSTITUTIONS OVER A DECADE: SOME CASE STUDIES

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Keywords: Maritime education and training (MET), female students, women promotion policies, gender equality, role of women in the maritime sector, women professional career

The limited number of female students enrolled in Marine Engineering and Maritime Navigation studies is becoming an increasing cause of concern in most MET institutions. Research in the field suggests that this is a widespread problem across countries, which requires immediate attention from the corresponding agents [1,2,3]. The proportion of women earning technical degrees has increased steadily during the last decades. However, technical professions, including those in the maritime sector, show a clear gender gap with respect to jobs and managerial positions, namely, both in their horizontal and vertical dimensions [2,4]. This gender inequity has its roots at university level where male students clearly outnumber female ones. Hence, a better understanding of the current state is key to provide a new insight into this problem so that we can find ways to reverse the present situation in the future.

This paper is a small-scale study, which attempts to describe this situation through the analysis of the figures of female student enrolment and graduation of some MET institutions. The participating centres are all Higher Education Schools of Maritime Studies, namely, thirteen schools in ten different European countries, two in South America and one in Africa. The last three institutions were included within a group of non-European countries. This way, European countries and non-European countries were analysed separately. With their collaboration, we gathered data corresponding to access and graduate figures of female students over the last decade (2009-2018), which were analysed in order to discover any trend or general pattern of evolution. With the aim of providing some tentative explanation on the patterns of evolution in the different schools, we also looked at the implementation of institutional policies aiming at gender equality and university groups promoting those policies.

The results of this study are grouped into three main areas; namely, the evolution of access and graduation figures of female students of all the universities analysed, the effects of the institutional policies for engaging female students and trends concerning figures of women engaged in professional careers at sea in Spain over the last decade. As for the access and graduate figures for female students, in all the universities analysed the results show that there is still a small percentage of them that begin and complete their training in MET institutions during the period evaluated and, contrarily to our expectations, the situation does not improve over time. Concerning institutional policies, in the majority of countries analysed, no promotion policy for female students in Maritime studies was implemented over the period studied except for Szczecin Maritime University and Universitat Politècnica de Catalunya, which resulted in a slight increase in the number of female students admitted those years. Finally, with respect to women engaged

in professional careers at sea in Spain, figures show that their representation is still quite limited and that women still have a long way to go in the maritime professional sector in Spain.

The findings and observations of this study illustrate how the gender gap in maritime education and training continues in all the institutions analysed over the last decade. A few attempts have been made at promoting the incorporation of female students in higher education and some have already borne their fruits although they may not have reached the intended equity expectations [5,6]. Nautical Science and Maritime Transport studies are, in general, the ones with higher percentages of female students and also the ones with a lower dropout rate. Although the mean value of female students enrolled and graduated in Maritime studies in some European MET universities between 2009 and 2018 does not show a raising tendency for any of the studies examined, it is unclear, however, to what extent these results reflect an actual current trend. In order to determine a clearer tendency a wider sample of MET institutions would have to be surveyed. In the professional sector in Spain the situation repeats itself, namely, the percentages of women obtaining their CoCs is higher in the Navigation area and lower for Marine Engineering. However, this situation worsens as women often, and more frequently than men, abandon their careers before reaching high positions.

Most of the times, gender issues seem to be entirely dependent on institutional leaders who are favourable to set guidelines for more inclusive gender-policies. This awareness and willingness to change policies is welcome but it is not enough. If there isn't a perception of having a real problem, possible solutions won't be addressed and there is an urgent need for a new push to overcome gender imbalance and guarantee the success of gender equity at international level. There have already been some attempts at implementing international programmes to promote gender equality and women advancement. In line with this, the joint involvement of national maritime administrations and international maritime organisations and agencies in the development of gender equity policies might be an important and more effective step towards developing a more egalitarian and inclusive maritime education and training system.

Finally, this paper also raises a broader question: When should promotion of maritime studies begin among prospective female students? Beginning promotion at university level might be too late, as female students may have already anticipated more humanistic degrees. Thus, starting promotion in secondary, and even primary, education could be a more successful attempt to obtain better results to leave behind the present gender inequality in maritime studies.

REFERENCES

[1] Universitat Politècnica de Catalunya, BarcelonaTech (UPC). *I Pla Director d'Igualtat d'Oportunitats 2007-2010*. Annex I – Evolució demogràfica de gènere. Barcelona: 2007.

[2] De la Campa, R.; Bouza, M.A.; Estopá, H. and Alcolea, R.M. The role of Spanish women in the merchant marine in XXI century. In: *2013 International Conference Proudly Empowering Women in Maritime*: May 2013, Barcelona, Spain, 29-50. ISBN 9788476539996.

[3] Romero Lares, M.C. and Kitada, M. An overview of the United Nations millennium development goal on gender equality and empower of women (in the maritime sector). In: *2013 International Conference Proudly Empowering Women in Maritime*: May 2013, Barcelona, Spain, 18-28. ISBN 9788476539996.

[4] Boström Cars, M. and Österman, C. Mind the gap! Maritime Education for gender-equal career advancement. *In: Maritime Women: Global Leadership*: 143-154. 2015, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-45385-8_11

[5] International Maritime Organization (IMO). *Strategy on the Integration of Women in the Maritime Sector (IWMS)*. IMO'S Women in Development Programme, 1989.

[6] Universitat Politècnica de Catalunya, BarcelonaTech (UPC*). III Pla d'Igualtat de Gènere de la UPC*, 2016-2020. Barcelona: 2016.

THE ROLE AND IMPACT OF GECAMET RESEARCH IN EMPOWERING FEMALE SEAFARERS

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This paper presents the results of the transnational research "Gender Equality and Cultural Awareness in Maritime Education and Training" (GECAMET), funded by the Nippon Foundation and IAMU in 2017-2018. The research is based on the analysis of questionnaires results sent to over 1000 representatives of the world maritime industry: maritime universities male and female cadets, seafarers, leaders in administrative positions of companies from the maritime business sector. The most important outcome of the GECAMET project is the input brought in updating the ILO Maritime Labour Convention (MLC) convention.

Suitability to a maritime career has more to do with individual's abilities than with gender or nationality. In order to motivate more females pursue a seafaring career and to develop their leadership abilities, a framework of inter-connected effective actions must be delivered by shipping sector stakeholders: MET institutions, shipping companies, authorities, NGOs and community. The GECAMET research project has a key role in advancing research in the domain of women seafarers' motivation to join maritime universities and sea careers. The aim of the research was to evaluate the complexity of the relation established between human factors, shipping companies, ship management practices and MET institutions on issues of gender equality and cultural awareness. The key words that define the vision and fundamentals of the research is "diversity and complementarities", meaning both complementarities, gender and cultural diversity met in shipping, as well as the diversity and complementarities met inside the research team formed by 10 representatives of maritime institutions across the globe coming from 5 continents: Australia, Northern America (Canada), Europe (Spain, Norway, Romania), Asia (Philippines, Vietnam, South Korea) and Africa (Ghana).

The effectiveness of the research is reflected in proposing concrete measures of good practice to be implemented in order to motivate women to join the shipping sector and to improve the work environment on board ships with mixed crews. Such concrete measures are focused in updating MLC with necessary requirements for seafarer females.

Development of GECAMET project is timely necessary, as in the next ten years, the world merchant fleet is expected to grow, together with the demand for seafarers. According to latest 2015 BIMCO and ICS Manpower Report, the global demand for seafarers in 2015 was estimated at 1,545,000 seafarers, with the industry requiring approximately 790,500 officers and 754,500 ratings. Therefore, MET institutions have an important role in providing officers of both genders, as the current supply-demand situation reveals a shortage of 16,500 officers. In such context, it is necessary to underline IMO Secretary General, Mr. Kitack Lim's public statement: "The importance of women as a future source of [seafaring] human resources cannot be overstressed" and shipping world "cannot afford to ignore such a rich and still largely untapped source of quality recruits" (25 June 2016, International Seafarers Day, Philippines). His affirmations consolidate a long journey to a challenging, yet sustainable assignment of promoting the role of seafarer women in a male-dominated seafaring industry.

IMO and the United Nations had several initiatives in promoting women to join the shipping sector. The years 1976-1985 were designated the United Nations Decade for Women during which many agencies of the United Nations sought to implement programs to achieve gender equality. IMO produced its strategy for the integration of women into the maritime sector in 1988 and began implementation of the IMO Women In Development Programme since 1989, concentrating

on equal access to maritime training through both mainstream programs and gender specific projects.

According to ILO's 2003 study "Women Seafarers: Global employment policies and practices", women represented only 1-2 per cent of the world's 1.25 million seafarers at that date. In the cruise line sector, they represented 17-18% of the workforce. Ninety-four per cent of women were employed on passenger ships (with 68% on ferries and 26% on cruise ships) and only 6% were employed on cargo vessels (i.e., container ships, oil tankers, etc.) Regarding jobs, there are women shipmasters and chief engineers, as well as other officers. Though, generally, women are working as hotel staff on passenger ships. Of this latter group, 51.2% of women at sea come from OECD countries, 23.6% from Eastern Europe, 9.8% from Latin America and Africa, 13.7% from the Far East, and 1.7% from south Asia and the Middle East. The statistics regarding women seafarers needs to be updated, but overall, there are no expectations in consistent improvement of the situation.

Male-centred workplace culture and stereotypes influences women's choice to join or leave the shipping sector. The number of women in maritime professions is increasing, yet shipping remains a male-dominated industry. A similar situation is met in most of the maritime universities. As the shipping industry continues to grow, sustainability will be dependent on more women entering the maritime professions. GECAMET research results make a change in this aspect.

WOMEN IN THE MARITIME INDUSTRY

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Keywords: IAMU 2018, Barcelona, the maritime industry, Gender Balance

Abstract. Maritime industry plays an essential role in development and sustainable progress of the modern world. Almost each country of the world depends on maritime-based providing export and import of necessary goods. Thus, maritime transport is the most essential part of global the trade and the global economy.

The main aim of the research is to analyze the prospects of women involvement into such important sector, identifying existing difficulties and problems, focusing on the current situation.Finally, we'd like to propose the ways to make this activity more suitable and attractive for women, fixing on the job opportunities .

Marine industry offers a wide range of job opportunities (including shipbuilding, shipping and management) for employers and improves the standards of living in the industrialized and developed world. However, even a brief review shows that it is a male-dominant sector of industry. The reasons for this phenomenon are mainly caused by social, cultural and religious traditions established thousands years ago. Years ago, the main obligation of women was to be a housewife, but currently the role of women in society is changed and no longer women want to be discriminated. Involvement into maritime industry provides many benefits for women, such as good salary, business and social contacts with different people and cultures and there is no reason to block female employment in maritime industry of the twenty first century.

Thus, in order to promote the role of women in maritime industry, The International Maritime Organization (IMO), in support of International Women's Day 2015 launched the video "Making Waves: women leaders in the maritime world"[1].

Accordingly, a powerful shift towards promotion of involvement of women to marine industry was provided, assisting females all over the world to find their ways in the world of equal opportunities.

REFERENCES

[1] IMO. International Maritime Organization [online]. London: IMO, 2018. [viewed date 22 May 2018]. Available from: <http://www.imo.org/en/MediaCentre/HotTopics/women/Pages/default.aspx>

Safety and Security

EXTENSION OF PREVENTIVE AND PROTECTIVE MEASURES TO REDUCE THE RISK OF KIDNAPPING IN PIRACY

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Keywords: Maritime piracy, threat, attack against ships, Code ISPS, risk management, target, seafarers kidnapped

ABSTRACT

Maritime piracy has been and remains one of the problems in the maritime security which is going to evolve with an increasing threat, affecting straight to the ships' crews that sail through areas considered as High Risk Areas where modern pirates sow the fear to keep it as a lucrative activity with an economic cost of about $12 billion dollars annually. Currently, seafarers are potentially exposed to a wide variety of threats.

This study tries to implement series of measures to minimize the risk of pirate attacks and their consequent human and economic losses.

Based on the statistics provided by the official agencies (IMO[1], ICC-IMB[2], MSCHOA[3]), there is a continuity and increase in the number of events. After consulting training centers and specialized articles we appreciate a lack of awareness and training on this matter.

It should be emphasized that seafarers, who are mostly affected by piracy, endanger their lives and freedom. Moreover, the whole maritime industry has had to put into practice a set of self-protection measures on ships and has been forced to alter longer navigation routes to avoid the waters infested by pirates. In response to abductions in the Sulu Sea area, the IMB recommends that ship owners avoid this area and navigate the west of the island of Borneo.

Recently, the work of the seamen who sail by hot areas[4] of the world is affected by the fear of being kidnapped, robbed or killed by pirates.

In 2016[5], 62 sailors were kidnapped for a ransom, which is the highest figure during last ten years. Furthermore, in 2017 the numbers increased and it ended with 75 kidnappings, 91 taken hostages, 6 injured and 3 dead, figures that indicate that the problem persists and intensifies.

[1] International Maritime Organization
[2] International Chamber Of Commerce - International Maritime Bureau
[3] Maritime Security Centre – Horn of Africa
[4] Nigeria, Gulf of Aden, Sulu Sea or Somalia
[5] International Maritime Bureau

In the Gulf of Aden, after a period of inactivity from 2012 to 2017, the attacks have been produced again, which confirms that they still retain the capacity to attack ships in the high sea

In the Gulf of Guinea we have the worst situation in number of kidnappings. From 49 kidnappings in 2017 (Data up to September), 80% were conducted by Nigerian pirates.

At present we have standardized in 2011, the IMO course 3.23 "Actions to be taken to prevent acts of piracy and armed robbery", which is not mandatory, however some countries, such as the Philippines encourage and demand it before embarking since 2010.

The benefits obtained by the pirates across the payments of the rescues have led several states, such as the United Kingdom, to discourage the rescues payments. The main argument is that the rescues sustain the crime and the terrorism. Therefore it is necessary to impose an absolute ban of the financing of the terrorism in an effort to eliminate this type of attacks, as it is the case of Abu Sayyaf in the Philippines, an affiliate to the terrorist group ISIS and known to be extremely violent both in the taking of ships and in the treatment of the hostages. However in other cases of piracy the rescue operates in a strictly commercial environment that is different from terrorism.

Pirates often abuse seafarers either to force them to do what they want or purely for enjoyment. Normally, these incidents are performed under the influence of drugs.

We conclude that compulsory training is necessary to cross the areas of risk and it is recommended that ship owners increase their expenses on the security measures and the professionals dedicated to the protection.

REFERENCES

[1] Burnett, John S. Dangerous Waters. Modern piracy and terror on the high seas. London. Dutton. Penguin Books. 2002.

[2] Gray, J. *Maritime Terror*. Colorado: Paladin Press, 2011

[3] Ibañez, Fernando. La Amenaza de la piratería marítima a la seguridad internacional. El caso de Somalia. Universidad de Zaragoza. 2012.

[4] Murphy, Martin N. Contemporary piracy and maritime terrorism. The threat to international security. London. The International Institute for Strategic Studies. Adelphi Paper. 2007.

[5] IMO. *International Maritime Organization.* Model course 3.23. Actions to be taken to prevent acts of piracy and armed robbery. 2011 Edition.

ASSESSMENT AND MANAGEMENT OF RISKS IN INDUSTRIAL FISHERY

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Keywords: fishing vessel, accident risks, trip scenario, risks assessment

MAIN RISKS OF CASUALTIES AND ACCIDENTS OF THE FISHING FLEET

Risks assessment and management in industrial fishery can be realized at several stages.
The first stage is recommended for carrying out when preparing a vessel for a trip. The composition of the information necessary for the assessment of conditions of the trip should be determined and analyzed. Also studying previous cases of accidents, risks that may arise during the trip of the vessel to the fishing ground, handling (unloading, supplying, bunkering) at sea and in ports is carried out. It is very important to define cause-effect relationships.
The main types of accidents with fishing vessels are the same as for other vessels: collisions; groundings; overturning due to the loss of stability; pile on the pier or other vessels; loss of motion due to an engine failure; loss of maneuverability due to the steering failure; fire [1].
But there may also be specific accidents such as:
– snagging of fishing gear and their loss;
– failure of hydroacoustic equipment;
– loss of fishing gear with the hook on reefs or underwater rocks;
– winding nets or ropes on the screw;
– pile when mooring the board of a transport ship, etc. [2].
The following differentiation of sources of causes of emergencies is suggested:
– the human factor as a source of accident causes is characterized by the skill level of operators (navigators, pilots, dispatchers, etc.) and the level of their psychophysiological stability;
– technogenic factors which are characterized by technical condition of the vessel, machinery and mechanisms, navigation and fishing equipment, etc.;
– hydrometeorological and oceanological conditions [3].

Scenario of a fishing vessel trip

At the second stage, a scenario plan for the trip of the fishing vessel is developed. The main periods of the trip are considered in the context of "sources of accidents - causes - risks - possible consequences". This scenario includes the following stages:
– preparation the vessel at the port for work in the fishery;
– the trip of the vessel to the fishing ground;
– searching fish schools, fishing (catching);
– loading / unloading and bunkering at the sea;
– transportation the catch to the port.
A set of processes and conditions with logical links between them represent a generalized model (scenario) of arising and development of emergencies and accidents of fishing vessels. The scenario method allows to define “bottlenecks”, predict developing emergency situations, identify tasks that are necessary to solve for preacting them or reducing possible negative consequences. Then an analysis of the scenario plan is carried out. It allows to define of possible risks during the forthcoming trip. Risks priorities (ranking) are defined and risk assessment methods are chosen. Qualitative and quantitative risks assessments are determined. An integral risk assessment is calculated.
At the third stage, the acceptable values of the risk is calculated and compare with risk assessments. A decision on the realization of the trip (or other operation) is made. In the case of the high risk a decision to develop organizational and technical measures to reduce the level of risk is made.

At the fourth stage, a plan of organizational and technical measures is developed and its implementation cost is calculated. Also the effectiveness of the measures is assessed.

Tasks of risk management in industrial fishery

An analysis of possible scenarios of the emergency situations development allows determining both the most common characteristics and prerequisites for the emergence sources and also identifying possible areas of actions for the purpose of assessing the situation and developing preventive measures. The structure of practice-oriented tasks for the risks management includes:

– monitoring and an analysis of accidents, natural, technogenic and human factors related to the safety of navigation and fishing, etc.;

– predicting the dynamics of future conditions for the vessel trip, arising, development and consequences of emergency situations;

– identification of potential hazards and risks associated with fishing and shipping of cargoes;

– development of methods and models of the risk assessment, including determining the acceptable level of the risk;

– development of prototypes and methods for determining preventive measures aimed for reducing the level of risks in fishing and transportation of raw materials.

Risk assessment based on the theory of statistical decisions

The use of this method allows to find the best ways for actions in conditions of uncertainty and the associated risk. The uncertainty is often associated with the state of nature, i.e. the system “man – technics – nature” in the practice of industrial fishery. The “nature” is the element of the uncertainty in this chain. Only assumptions about possible states of the nature can be made. Whether the decision is profitable in a particular situation can be determined on the value of the risk. The value of the risk can be defined as the difference between the expected outcome of an activity in the presence of accurate data about the situation and the result that can be achived if this data is known exactly [4].

An example of a plan for the vessel trip to the fishing ground is considered in the paper. The expected hydrometeorological situation at the area of the trip is uncertain. Different scenarios of the situation are possible according to the forecast. In this case, it is possible to provide various route options. Each of variants will lead to certain results depending on the weather conditions. Calculation the vessel speed for different directions and the force of wind for each variant of the route according to the weather forecast is suggested. Assessment of these variants is made according to the time criterion under the conditions of the risk caused by weather.

There are principles and methods of approaches to the evaluation of the result of actions and the choice of the best solution when the probabilities of possible conditions of the situation are unknown. They can be represented by criteria of Wald, Savage, Hurwitz [5].

Thus, the paper demonstrates an approach to assessment and management of risks in industrial fishery.

REFERENCE

[1] Annual overview of marine casualties and incidents, EMSA http://www.emsa.europa.eu /emsa-homepage/2-news-a-press-centre/news/2903-annual-overview-of-marine-casualties-and-incidents-2016.htm, (2016)

[2] Safety and Shipping Review, Allianz Global Corporate & Specialty, http://www.rus-shipping.ru/upload/filearchive/AGCS_Safety_Shipping_Review_2016_file_397_6491.pdf, (2016)

[3] V. Torskiy, Risks in navigation, Odessa, Astroprint, (2007) (in Russian)

[4] S.S. Moyseenko and L.E. Meyler, Safety of sea cargo transportation, Kaliningrad, BFFSA, (2011) (in Russian)

[5] A. McNeil, R. Frey and P. Embrechts, Quantitative Risk Management: Concepts, Techniques, and Tools, Princton University Press, (2005)

CASE STUDY ON THE POTENTIAL OF INTERAGENCY INFORMATION EXCHANGE FOR OCEANS' GOVERNANCE

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Keywords: Maritime, Governance, Surveillance, Safety, Security, Information exchange

ABSTRACT

Oceans have plenty of opportunities but also many challenges for humankind. If, on the one hand, we can think of the benefits they can bring to the economy (e.g. maritime transport, clean energy, tourism), on the other hand, we should never forget the risks they entail (e.g. trafficking, piracy, accidents) nor their implications if not well preserved (e.g. overfishing, pollution, acidification). Therefore, they are evermore a global priority [1].

However, oceans' good governance [2] requires a comprehensive and permanent awareness of the maritime situation, which is a challenging task for which information is never too much. In fact, building a clear picture of what happens at sea implies considering the human activities and the environment in their multiple facets and dimensions. Therefore, obtaining relevant information is always an objective, be it to update, improve or augment the one already available.

As such, to achieve this objective, there are usually two options. One is to develop new capabilities (e.g. sensors and systems), and the other is to get it from other organisations. Nevertheless, although the latter seems more appropriate when the information is already available, it is not always the case, and so there is room for improvement [3], especially if the relevant organisations are from different sectors of activity.

There are many reasons that may hamper information exchange [4]; and one that we learned from experience is that often organisations lack a clear understanding regarding which information is already available by others, as well as how much it can help them to fulfil their own needs.

Therefore, this paper aims to present an example of the potential of the information exchange among public organisations concerned with the maritime domain, and so, to contribute to increase its practice and hence to improve ocean governance and its benefits.

The NIPIM@R project [5] aims to develop integrated maritime surveillance and marine environment monitoring in Portugal, by enhancing the exchange of relevant information among all national and international stakeholders through a solution based on the European Union Common Information Sharing Environment (CISE).

To understand the potential of information exchange, we conducted a survey, in which national organisations participating in NIPIM@R expressed, among others, their needs and availability from the set of 700 maritime surveillance information elements given. We have analysed the answers of five of those organisations and concluded that:

(1) Most of these organisations need much more information (9 times more in average) in their systems than they presently have.
(2) The majority (over 60%) of the information they need is already available in the systems of some of these organisations, but most of it cannot be received because the systems require features to use it.
(3) About 100% of the information needed, that can be used as soon as accepted, is already available in the systems of other organisations, requiring only their interoperation.

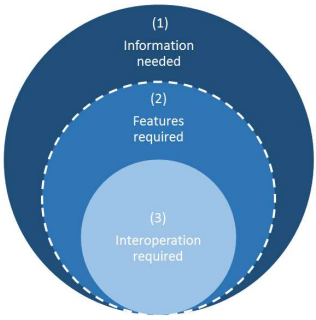

Figure 1. Information needed and available through exchange

As such, the exchange of information among these organisations has the potential to overcome many of their information gaps, and so to enhance their efficiency and effectiveness. However, to achieve this potential, these organisations will have to evolve their systems, by developing their interoperation and the features necessary to use the additional information. Nonetheless, these organisations will also need to find ways to obtain the information that is presently not being collected by any of them, which can be achieved by involving other organisations, by developing new capabilities or both.

REFERENCES

[1] United Nations, "Transforming our world: the 2030 Agenda for Sustainable Development," *General Assembley 70 session*, vol. 16301, no. October. pp. 1–35, 2015.
[2] European Parliament, Council, European Economic and Social Committee, and Committee of the Regions, "International ocean governance: an agenda for the future of our oceans. SWD (2016) 352 final." Brussels, p. 17, 2016.
[3] Council of the European Union, "European Union Maritime Security Strategy," Brussels, 2014.
[4] S. S. Dawes, "Interagency Information Sharing: Expected Benefits, Manageable Risks," *Journal of Policy Analysis and Management*, vol. 15, no. 3, pp. 377–394, 1996.
[5] J. Ribeiro, C. Santos, and S. Bryton, "Portuguese National Ocean Strategy 2013–2020," in *Handbook on the Economics and Management of Sustainable Oceans*, 1st ed., P. Nunes, L. Svensson, and A. Markandya, Eds. Cheltenham, UK: Edward Elgar, 2017, p. 616.

DISPLAY AND ALARM OF THE PREDICTED AREAS OF DANGER WITH OTHER VESSELS (PADs) IN THE ECDIS

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Keywords: safety of navigation; collision avoidance at sea; predicted area of danger; PAD; ARPA

Being A our ship and B another observed on the ARPA and the ECDIS, a potential point of collision (PPC) is a point where A would collide with B, as long as B maintains her course and speed. If the speed of A (S_A) is greater than or equal to the speed of B (S_B), there is only one PPC; but if $S_A < S_B$, there are two PPCs. Each PPC corresponds to a course of A, called collision course (CC). See the annexed figures. Considering a distance to which the manoeuver should be made in order to avoid the collision (MD: manoeuver distance), as well as a CPA (closest point of approach), two courses of A (C_{A1}, C_{A2}) are obtained for each PPC: one which passes by the stern of B (usual manoeuver) and another that passes by her bow.

A predicted area of danger (PAD) is an area around a PPC, within which it is considered that a risk of collision may exist, and therefore, it should be avoided. The PAD is determined by the courses C_{A1}, C_{A2}, and it is an ellipse whose major axis is the section of the trajectory of B that is limited by the intersections of the courses C_{A1}, C_{A2}, and whose minor axis is the half of the major one. Usually, due to its manual drawn, it is not considered an ellipse, but a hexagon.

If there is only one PPC, there will only be one PAD; while if there are two PPCs, two will appear. In the second case, the PAD corresponding to the PPC furthest from B (PPC2) is greater than the other one. This is because the relative speed, as shown in Figure 2, decreases when the course is altered to the opposite side where B is located (notice that $B_2B < B_1B$).

The potential of PADs for the safety of navigation can be enormous if they are transferred to the ECDIS, for example, in a layer containing them. Therefore, **the PADs could be treated as areas to avoid**, having the possibility of visualizing them, as well as of associating them with an alarm. In this way, it is possible to obtain information from the ARPA, which is the anti-collision equipment, but which would be integrated and managed in the ECDIS.

In addition, the PADs information enhances the accomplishment of the following rules of the International Regulations for Preventing Collisions at Sea, 1972, as amended:

Rule 5: *Look-out*

Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

Without prejudice to the proper look-out by sight and hearing, the automatic display and alarm of PADs in the ECDIS would become a mean that assesses rigorously the risk of collision, also providing additional information to other equipment.

Rule 7: *Risk of collision*

a) Every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist.

In this paragraph, the second part of the rule 5 is repeated almost literally, although focused on determining the risk of collision. In accordance to this goal, the display and alarm of PAD in the ECDIS would also contribute to this determination, as **the concept of risk of collision would translate into a geographical area**.

b) Proper use shall be made of radar equipment if fitted and operational including long-range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.

The automatic determination of PADs would provide an early knowledge of the risk of collision, and also become a systematic observation of detected objects, since the PADs of all echoes detected by the ARPA be obtained. Thus, a set of geographic areas to be avoided (either by A or by B, in accordance with the COLREGS) would be available at all times.

Regarding the early knowledge of the risk of collision, from the first moments in which an echo B is detected, its PPC and PAD can be determined. It only requires enough time to determine accurately the relative course (RC) of B. In the ARPA, this time can be considered 3 minutes. Then, once this interval has elapsed, the position of the PPC is adjusted as time passes, in the same way as it is done with the CPA and TCPA that the ARPA provides.

Also, a CPA and a MD must be established. However, the MD can be obtained from the TCPA, but it is demonstrated that the size of a PAD does not change with time; i.e.: along the time, the courses C_{A1}, C_{A2} change, but not the associated PAD. Thus, only a CPA is required.

Therefore, the display and alarm of the PADs in the ECDIS, would comply with the provisions of the rule 7.b), which until now, are applicable to the radar.

ANNEX: Determination of PPCs: The marks (+) above the relative course (RC) are the positions of the echo B on the radar screen. O is the zero speed position, obtained from the present position of B (point B), over the opposite course of B, a distance equal to her speed (S_B) in the same range that is drawn the speed of A (S_A).

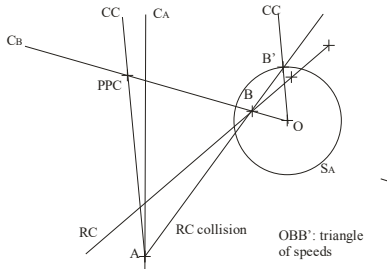

Fig. 1. Case with only one PPC: S_A (OB') > S_B (OB).

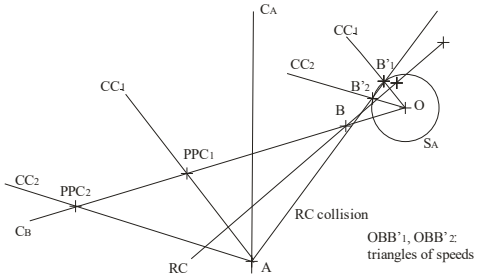

Fig. 2. Case with two PPCs: S_A (OB'$_1$, OB'$_2$) < S_B (OB).

REFERENCES

[1] A. G. Bole and W.O. Dineley, Radar and ARPA manual, Oxford: Butterworth-Heinemann, (1992).

[2] E. García Melón , A. C. Bermejo Díaz, and A. J. Poleo Mora, Cinemática náutica, Madrid: COMME, (1994)

[3] International Maritime Organization (IMO), International Regulations for Preventing Collisions at Sea, 1972, as amended.

[4] R. Rodríguez-Martos Dauer and R. Jaime Pérez, Manual del operador de arpa, Barcelona: Edicions UPC, (1996).

SAFETY AT SEA: RISK BASED THINKING (RBT) USING FUZZY LOGIC APPROACH

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Keywords: risk assessment, Heinrich's Law, human element.

NTERNATIONAL STANDARDS REGULATING RISK ASSESSMENT IN SHIPPING INDUSTRY

Risk assessment in shipping industry is an effective tool for decision-making in the process of planning the ship operations, and therefore it is regulated by many international instruments. First of all these instruments are SOLAS 74 and MARPOL 73/78 Conventions, as well as a number of mandatory codes. Convention STCW 78, as amended, also contains provisions for officers to have the skills of risk assessment in ship operations. Risk assessment and risk management are included as parts of many IMO guidelines, for example in "Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule-making process" (MSC / Circ.1023-MEPC / Circ.392), as well as in the revised "Guidelines on Fatigue" (MSC / Circ.1014). The relevance of risk assessment and management in cyber security is also beyond doubt. All of the above concerns the relevance of these issues in the MET process. It should be noted that risk is assessed by a Human, and therefore the question of the effectiveness of risk assessment mechanism is in the field of the Human Element.

STCW 78, as amended and MET

STCW 78 Regulation 1/8 "Quality Standards" obliges Parties to the Convention to apply the Quality Standard System in MET process. Practically all MET institutions of the world apply ISO 9001. The 2015 version of this standard also contains procedures for risk assessment. Thus, SOLAS 74, STCW 78, MLC 2006 and ISO 9001: 2015 form a coherent system for assessing and managing risk in the industry.

The main binding element of this system is a Human, and the main cause of all accidents at sea is the Human Element, which includes human errors. The influence of the Human Element on accident rate at sea reaches 90% or more. In this regard, risk assessment and management are an essential mechanism for improving the level of safety, as well as a powerful motivator for the profound mastery of the marine profession. It is impossible to correctly assess the risk in any ship operation without having the experience and knowledge in this field of activity.

Modified Risk assessment matrix

The standard formula for risk assessment consists of two components: the probability of an accident and the severity of its consequences. Paper [1] proposed to include into matrix the incidents, which do not directly relates to real losses, but mapping "unsafe working conditions", "unsafe actions" and "near misses". These incidents could contribute into the risk level in ship operations following the Heinrich's Law provisions. In fact, it is a linear extrapolation of the of the risk matrix elements,

presented in [2] into the newly formed Human Element area [1]. This is associated with ISM Code feedback information requirements, i.e. being in line with principles of a Just Culture.

The main difficulties in risk assessment are associated with a lot of uncertainties in the procedures and the lack of mathematical instruments to model the impact of these incidents on individual and also with difficulties to analyze the risk assessments by different experts. However the document [2] provides a reasonable basis for using such notion as "Subjective Probability" to apply it in practical tasks. This, in turn, opens the possibility to implement the fuzzy inference approach (MATLAB) for research and graphic visualization of risk matrix [3], [4].

MODELING THE RISK ASSESSMENT MATRIX BASED ON HEINRICH's LAW PRINCIPLES

The main idea for the modeling of the risk matrix by using fuzzy inference algorithm is to apply different types of membership functions, allowing the inclusion the reliability of subjective judgments by individuals in the risk assessment procedure. This reliability judgments depends on sea experiences of seafarer and can be visualized.

The paper presents the results of modeling of risk assessment matrix and visualization of risk based on Subjective Probability and a subjective assessment of the severity of the consequences of an incident, using the fuzzy inference algorithm. Visualization of results allows to improve the understanding of risk assessment process by students and seafarers.

REFERENCES

[1] V. Loginovsky, "Risk assessment, as an interdisciplinary subject", Proceedongs of 18th Annual General Assembly of IAMU- "Global perspectives in MET: Towards Sustainable, Green and Integrated Maritime Transport", Vol.II, pp.180-188, Nikola Vaptsarov Naval Academy, Varna, 2017.

[2] Revised guidelines for Formal Safety Assessment (FSA) for use in the IMO rule-making process, MSC-MEPC.2/Circ.12/Rev.1, IMO, 18 June 2015.[viewed date 12 May 2018]. Available at https://www.google.ru/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjwk_zX2cDZAhWBnSwKHbkyA7oQFggnMAA&url=http%3A%2F%2Fresearch.dnv.com%2Fskj%2FIMO%2FMSC-MEPC.2-Circ.12-Rev.1.pdf&usg=AOvVaw2TaSqOvMWbP1ZA6aTYhhGT

[3] V. Loginovsky, "STCW 78: Manila Amendments and Some Risk Assessment Aspects", Proceedongs of 12th Annual General Assembly of IAMU- "Green ships, Eco Shipping, Clean Seas", pp. 189-195, Gdynia Maritime University, Gdynia, 2011.

[4] A.F. Shapiro, V-C Koissi, "Risk Assessment Applications of Fuzzy Logic", Casualty Actuarial Society, Canadian Institute of Actuaries, Society of Actuaries,2015. [viewed date 12 May 2018]. Available at https://www.soa.org/.../2015-risk-assess-apps-fuzzy-logic.pdf

SECURITY ANALYSIS OF THE NATIONAL MARITIME TRANSPORTATION SYSTEM AS PART OF THE MARITIME CRITICAL INFRASTRUCTURES

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Keywords: maritime transportation system, maritime critical infrastructure, security assessment, crises management.

Abstract. The authors analyze the Bulgarian legislation in the maritime security domain and the national maritime transportation system in order to determine the bodies and their functions in favor of the security of the shipping and to look for a way for improvement. When the complex system theory (system approach) is applied and the maritime transportation infrastructures are counted as a part of maritime critical infrastructures, the security analysis in the framework of the whole system will be spread over its part - the transportation system. When common standards for security environment are established the control of the security processes in the regional aspect and the crises management in the security domain will be easier and more effective.

INTRODUCTION

If we turn back to the history, we could obtain the information that the establishment and maintenance of the seaways and ports security was an important priority of coastal state authority such as in the ancient Greece (6th-4th centuries BC). For instance, a port fee was introduced as a kind of tax amounting up to 2% of goods on board because warships patrol the sea lanes, keeping safe merchants from pirate`s raids. Normally, when the pirates intensify their invasions, the taxes have been raised temporarily even up to 10% [8]. Nowadays, globalization provoke intensification and sophistication of the transport connections. Moreover, maritime transportation system becomes more complex in structural aspect than ever. The paper 'National prospective for transport infrastructure development' adopted by Bulgarian Ministry of transportation' says that the "Safety and security of the transportation system" is set as paramount priority. The Sectoral Operational Program "Transport" has been developed due to need of enhancement the fundamental national sectoral policy. It delineates detailed way for implementation of the Strategy for development of transport infrastructure. The main objective is to materialize sustainable transport connections between all economic actors. The specific objectives define the framework for integration of the national transportation system into the EU transport network thus achieving a balance between wide spectrum transport subsystems. It gives noticeable indications that the government should be obligated to develop a sustainable transportation system.

THE RESEARCH PROBLEM IDENTIFICATION

The IMO Concept of a sustainable maritime transportation system [7] determines its elements and the way to create favorable conditions to maintain the sustainable system state. This concept recognizes the international maritime transport system as a mechanism for global trade economic growth and sustainable development.

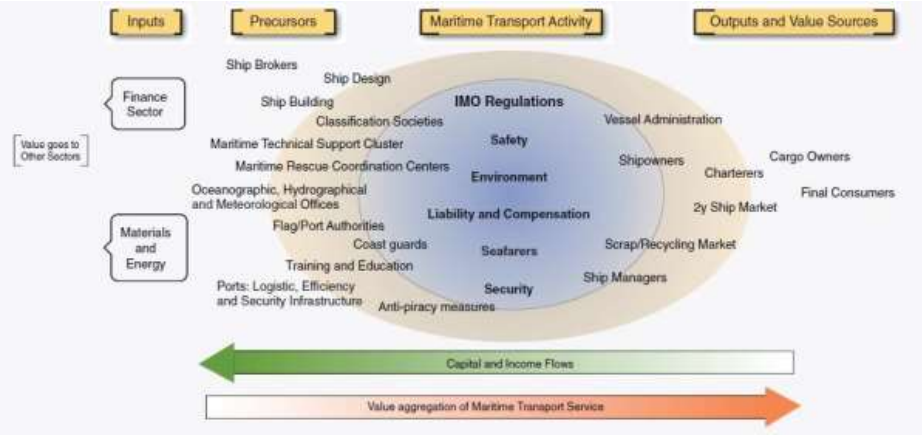

Fig.1 The maritime transport system [7]

One of the key elements of the 'Maritime transport activity' area is Security. The implementation of security here is based on IMO regulations [1].

The Bulgarian maritime transportation system is part of the international transportation system and includes components, connected with transport infrastructures, maritime business, regulatory legislation and bodies, service providers, owners, customers, educational bodies, logistic chains etc. It continues and connects the routes of other modes of transport - land and air. The preference of a particular type of transport for a given activity is determined by economic, tourist, geographic, temporal and other considerations, including the security (environment). The modern criterion of security is increasingly high. In a theoretical sense, the term "security" is associated with the "risk" and "protection" categories.

Bulgaria has adopted own national legislation on the subject synchronizing it with the relevant international one (IMO and EU level).

Nevertheless, it is called "system", in fact only geopolitical, financial and investment aspects are concerned. The element physical security is replaced with the operational safety. But the security environment has to be controlled and improved.

THE AUTONOMOUS VESSEL: ANALYSIS OF THE WAY TO WALK

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Keywords: Autonomous ship, automatic ship, safety, environment, manning, human resources.

ABSTRACT

Since the beginning of maritime navigation, vessels have been built, which, carrying out their main function, that of the maritime transport of goods and people, have progressively incorporated the technological advances of each moment, and made this mode of transport more efficient. , safe, reliable and respectful of the marine environment.

At present, the level of technological advances in all engineering branches involved in the construction and operation of a ship, have a level of development that is allowing all actors present in the world of maritime transport, the possibility of construction of the so-called autonomous ship in its different versions, that is, manned with different levels of automation, or unmanned and directed from shore, etc.

In this paper a first classification and definition of autonomous ship is made in its different versions. A detailed study of the technological advances that have to be applied so that a ship complies with the definitions of autonomy proposed, as a manned vessel with different degrees of automation and therefore of operation, or unmanned and telematically directed from the shore.

The regulations of construction, classification, safety, pollution, responsibility, etc. are analyzed. Fundamentally techniques that allow the ship to be autonomous, and the possible changes that should be introduced.

The applicability of the autonomy to the different types of vessels, their routes and navigation conditions are also analyzed, and several cases of breakdowns and possible solutions, navigation operation in the open sea, channels, straits, etc., will be simulated.

Finally, an little economic study of the viability of the autonomous ship in its different versions will be carried out.

REFERENCES

[1] AAWA White paper, white paper on Remote and Autonomous Ships of 21 June 2016 of the Advanced Autonomous Waterborne Applications Initiative (AAWA).

[2] Campbell, Abu-Tair and Naeem, 'An Automatic COLREGs-compliant obstacle avoidance system for an unmanned surface vehicle', (2014) 228(2), Journal of Engineering for the Maritime Environment.

[3] Carey, all hands off deck? The legal barriers to autonomous ships, Ms. Luci Carey, Research Associate, Centre for Maritime Law, Faculty of Law, National University of Singapore ("NUS"), NUS Centre for Maritime Law Working Paper 17/06, NUS Law Working Paper 2017/011.

[4] Cartner, Fiske and Leiter, Cartner, John A.C., Fiske, Richard P., Leiter, Tara L, The international Law of the Shipmaster, Informa 2009.

[5] CMI Position Paper, CMI International Working Group Position Paper on Unmanned Ships and the International Regulatory Framework, Birch Reynardson et al., 29 March 2017.

[6] Report of the Danish Agency for Digitisation, 2015: 'Guidelines on IT risk management and assessment' (in Danish).

[7] Global Marine Technology Trends, Global Marine Technology Trends 2030 published by Lloyds Register, QinetiQ and University of Southampton, August 2017.

[8] Herman Bruserum, the carrier's responsibility for the physical properties of the ship: Liability basis. Marjus 294 (Oslo 2002) (in Norwegian).

[9] IMarEST, Institute of Marine Engineering, Science & Technology (IMarEST) – Written evidence (AUV0064) of 26 October 2016 on Autonomous Vessels.

[10] Lloyd's Register Foundation, Foresight Review of Robotics and Autonomous Systems, LLoyd's Register Foundation, October 2016.

[11] Reed, Kennedy and Sliva, 'Responsibility, Autonomy and Accountability: legal liability for machine learning' Queen Mary University of London, School of Law, Legal Studies Research, Paper No 243/2016.

[12] Report on Automated and Connected Driving, Report on Automated and Connected Driving by the Ethics Commission appointed by the German Federal Minister for Transport and Digital Infrastructure – June 2017.

[13] Serdy, Tsimplis, Veal et al. A Serdy, M Tsimplis, R Veal et al., Liability for Operation in Unmanned Maritime Vehicles with Differing Levels of Autonomy (European Defence Agency, Brussels, 2016).

[14] Sozer, Analysis of the definitions of a "ship" in a number of international maritime conventions by Dr. Bulent Sozer, Turkey, enclosed as an annex to the CMI Working Group on Ship Nomenclature, available from the CMI website: http://comitemaritime.org/Uploads/Work%20In%20Progress/Ship%20Nomenclature/Ltr%20to%20Presidents%20re%20IWG%20on%20Vessel%20Nomenclature%20-%20080316.pdf

[15] Threat Assessment, The cyber threat against the maritime sector, Threat Assessment by the Danish Defence Intelligence Service's Centre for Cyber Security (CFCS) – March 2017.

[16] Van Hooydonk, E Van Hooydonk: "The law of unmanned merchant shipping – an exploration", [2014], Journal of International Maritime Law 403.

[17] Veal and Tsimplis, R. Veal and M Tsimplis: "The integration of unmanned ships into the lex maritima", [2017]. Lloyd's Maritime and Commercial Law Quarterly 303.

[18] Design Code, Design Code for Unmanned Marine Systems – Lloyd's Register, February 2017.

[19] Guidelines on Maritime Cyber Risk Management, IMO, July 2017.

[20] Maritime UK Industry Code of Practice", version 1.0, November 2017.

[21] MASS Code of Conduct, The Maritime Autonomous Systems Surface, MAS(S) Industry Code of Conduct made by the UK Marine Industries Alliance, March 2016.

[22] ShipRight Procedure, Cyber-enabled Ships – ShipRight procedure – autonomous ships, Lloyd's Register, first edition, July 2016.

[23] The Guidelines on Cyber Security Onboard Ships, BIMCO, CLIA, ICS, INTERCARGO, INTERTANKO, OCIMF & IUMI, July 2017.

Shipbuilding, Marine Engineering

ADVANCES IN THE DEVELOPMENT OF A COMPUTATIONAL MODEL FOR ANALYSIS OF SHIP NAVIGATION IN BRASH ICE

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ABSTRACT

Brash ice is the accumulation of floating ice made up of blocks no larger than two meters across. Navigation in brash ice is becoming more usual as new navigation routes are being opened in the Artic regions. This navigation brings new concerns regarding the interaction of ice blocks with the ship. This work presents recent advances towards the development of a computational model for simulation of this navigation condition including the interaction among the ship and the ice blocks.

The computational tool developed in this work is based on the coupling of a Semi-Lagrangian Particle Finite Element Method (SL-PFEM) with a multi rigid-body dynamics tool. The Particle Finite Element Method [1] is a versatile framework for the analysis of fluid-structure interaction problems. The PFEM combines Lagrangian particle-based techniques with the advantage of the integral formulation of the Finite Element Method (FEM).

It has been shown [1][2] to successfully simulate a wide variety of complex engineering problems, e.g. free-surface/multi-fluid flows with violent interface motions, multi-fluid mixing and buoyancy-driven segregation problems etc.

The latest development within the framework of the PFEM is the X-IVAS (eXplicit Integration along the Velocity and Acceleration Streamlines) scheme [2][3]. It is a semi-implicit scheme built over a Semi-Lagrangian (SL) formulation of the PFEM.

In this work, the SL-PFEM model has been coupled with a multibody dynamics solver, able to handle the interactions between thousands of bodies, representing the different ice blocks. The interaction between the fluid flow and the ice blocks is taking into account by enriching the finite element space at the boundaries of the different blocks.

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REFERENCES

[1] Idelsohn, S., Oñate, E., Del Pin, F. “The particle finite element method: a powerful tool to solve incompressible flows with free-surfaces and breaking waves”. International journal for numerical methods in engineering, vol. 61-7, pp. 964-989, 2004.

[2] Nadukandi, P., Servan-Camas, B., Becker, P.A., Garcia-Espinosa, J. “Seakeeping with the semi-Lagrangian particle finite element method”. Computational Particle Mechanics 4 (3), 321-329, 2016.

[3] Idelsohn, S.R., Marti, J., Becker, P., Oñate, E.: Analysis of multifluid flows with large time steps using the particle finite element method. International Journal for Numerical Methods in Fluids, Vol. 75, No 9, 2014, pp. 621–644.

AN OPTIMIZATION OF MARINE DIESEL ENGINE OPERATION PARAMETERS WHEN USING A MIXED FUEL (DO AND PALM OIL) AS ALTERNATINE FUEL

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ABSTRACT

As well known, vegetable oils become more and more selected as alternative fuel for marine application due to their advantages in comparison with the fossil fuel such as renewable features, no sulfur content and simple production technology. However, there also can find some negative problems when vegetable oils or their products being used as fuel for marine diesel engines. Firstly, the different physical features and chemical structure of vegetable oils or mixed fuel with vegetable oils, can make worse fuel combustion in marine diesel engines. Secondly, the different properties of vegetable oils can influence on the engines' injection timing and consequently on their exhaust gas emissions and fuel consumption. So, in order to use vegetable oils or the mixed fuel without any problem, an adjustment (re-setting) of fuel supply system of marine diesel engines must be taken into consideration. Therefore in this paper, author will introduce a method to adjust technical parameters of fuel supply system of marine diesel engines using a mixed fuel (alternative fuel) in order to match required exhaust gas emissions and performance.

First part of paper, there will introduce a method to assess significant influences of an alternative fuel that may make changes of a diesel engine injection timing. These injection timing changes can make different exhaust gas emissions and performance of diesel engines than the optimized settings done by the engine maker previously. The properties that will make main effect on the fuel injection timing are the speed of sound, the isentropic bulk modulus and the fuel viscosity. The impact of sound speed on fuel injection timing can be estimated for fuel supplied system by using the speed of sounds of diesel oil and an alternative fuel. The impact of the isentropic bulk modulus can be calculated by a well-known model for fuel compression as following:

$$\varphi_{inj} = \frac{(p_{inj} - p_0)V_f}{Kv_\varphi A_p} \quad (1)$$

Where: φ_{inj}- a crankshaft rotation required to reach a nozzle open pressure [^{0}CA]; p_{inj}- nozzle open pressure [Pa]; p_0- initial system pressure [Pa]; V_f-volume of compressed fuel [m^3]; K- isentropic bulk modulus [Pa]; v_φ- speed of plunger [m/s]; A_p- area of plunger [m^2].

Author will also use spray models to evaluate impact of an alternative fuel on the characteristics of fuel spray such as a fuel spray length, diameter of drop size. Because, these spray characteristics are great importance in pollution formation and energy efficiency of diesel engines.

Second part, there will introduce a method to optimize working parameters of a diesel engine when using a mixed fuel. A meaning of optimization of working parameters of diesel engines is concerning with minimizing exhaust gas emissions and fuel consumption of diesel engines. To do so, the response surface methodology will be applied. The response surface method is statistical and mathematical tool useful for developing, improving, optimizing and determining the interactions between the variables and responses. In this case, the exhaust gas emissions and fuel consumption of a diesel engine are response variables, and these are functions of fuel injection start and feature of fuel spray. Then, mathematical model can be expressed:

$$y = f(x_1, x_2, x_3 \ldots\ldots x_n) \pm \varepsilon \quad (2)$$

Where y is dependent variable, f is response function, x_i are dependent variables and ε is the fitting error. In this paper, the investigation involved a selection of variables that impact on the exhaust gas emissions and performance of a marine diesel engine that uses a mixed fuel (DO and Palm oil) as alternative fuel.

The goal of response surface methodology is to rapidly and efficiently reach the vicinity of the optimum. Therefore, the first order-model will be appropriate to solve the requested problems. To use response surface methodology as an optimization technique, a mathematical model of goal must be defined in form of an objective function. In this case, to optimize exhaust gas emissions and fuel consumption of a marine diesel engine using an alternative fuel (mixing fuel), an objective function will be applied as follow:

$$f(x) = \frac{1000}{\left(\frac{NO_x}{NO_{x,g}}\right)^2 + \frac{g_e}{g_{e,g}}} \tag{3}$$

Where: $x=(x_1,x_2,\ldots x_n)$ array of variables (SOI, pressure of nozzle open, mixing ratio of vegetable oil); NO_x – measured emission level; g_e- fuel consumption; $NO_{x,g}$- goal emission level; $g_{e,g}$- goal fuel consumption.

An experiment, then has been curried out on Daihatsu marine diesel engine 6LU32 equipped at Lab of Faculty of Marine Engineering (Vietnam Maritime University). The marine diesel engine with an output of 900kW at speed of 340rpm is driving a hydraulic brake. The Lab also is equipped with modern measuring instruments supplied by well-known company AVL (Austria). The alternative fuel is a fuel that is made by mixing diesel oil (DO) with pure palm oil with different ratio from 5% to 30%. Through a mass of tests, author and research team have found very good results for optimizing the working parameters of the marine diesel engine using mixed fuel (DO and Palm oil) as alternative fuel to substitute fossil fuel (DO).

On conclusion is that the response surface method is good tool to optimize the working parameters of a marine diesel engine when the diesel engine is converted to use mixed fuel (alternative fuel) to replace the conventional fuel (fossil) in order to achieve the objective of environment protection and energy saving. After re-setting in accordance with newly chosen parameters (SOI, NOP, mixing ratio) by above mentioned method for fuel supply system, the marine diesel engine has been working very well with proper exhaust gas emission (NO_x) and fuel consumption. The above mentioned optimization method can be applied in order to re-sett technical parameters of a fuel supply system for any marine diesel engine when it will use an alternative fuel to substitute conventional one.

REFERENCES

[1] M.E.Tat and J.H. Van Gerpen; Measurement of Biodiesel Speed of Sound and Its Impact on Injection Timing; Department of Mechanical Engineering Iowa State University Ames, Iowa; USA February 2003;

[2] Taewon Lee and Rolf D. Reitz; Response Surface Method Optimization of a HSDI Diesel Engine Equipped with a Common Rail Injection System; Internal Combustion Engine Division Fall Technical Conference Insert Conference Date and Location; October 2015;

[3] Nuran Bradley; The Response Surface Methodology; Master of Science in Applied Mathematics & Computer Science, Indiana University South Bend, USA 2007;

[4] Dang Van Uy & Research Team; *Research and develop a technology solution in order to convert marine diesel engines of small and medium scale to use blended straight vegetable oils as alternative fuel",* No.04.11/NLSH, Haiphong 2014;

[5] Dang Van Uy & Research Team; An Investigation to Design and Manufacture a ECU for Marine Diesel Engines Using Blended Fuel (DO & Vegetable Oils); Vietnam Ministry of Industry &Commerce, Hanoi 2017;

[6] Dang Van Uy & Research Team; To Build up Technical and Management Solutions in Order to Decrease Fuel Expenditures for Vietnam National Ocean Fleet; Ministry of Transportation, Hanoi 2014;

HYBRID GAS-ELECTRICAL POWER & HEAVY DUTY PROPULSION. TEST PLATFORM

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Keywords: Hybrid power systems, natural gas, heavy duty propulsion systems, electrical systems, small vessels, impact of technology, control, regulation, environment, reduction of emissions, mariner engineers, training, education.

Thematic area: Shipbuilding, Yachts and Navigation.
Maritime Environment

ABSTRACT

This paper presents the initial results of a hybrid generation system (gas - electric), to feed the electric motors which propel a small or medium vessels. Primarily, the hybrid electric systems basically include an internal combustion engine, a generator and an electric motor. The diesel engine is the one that does the heavy duty, providing the energy required by the electrical system, also supports load variations at low speed or cruising speed, as well as to the supply of energy for lights, electronic navigation systems, auxiliary systems and other comfort loads such as hotel facilities.

Presently, many technical challenges associated with the design of hybrid-electric propulsion systems [1], [2] are under discussion. Regarding technical limitations, the loading level and perhaps even more important is to cope with the complexity of the hybrid systems. Concerning to technical limitations, we can, therefore, highlight the following:

- Pilot excitation control specialised in managing peaks of start dynamic loads
- Performance of crash-stop manoeuvre
- Protection / Control dilemma. In this sense, the overprotection sacrifices the exploitation of the transient behaviour of the rolling masses inertia

This complexity is observable in the generator behaviour depicted in figure 1, when the frequency converter (FC) that is feeding the propeller is disconnected, as a result of another motor starting. Albeit of being within the limits of the generator capabilities, the propulsion is untimely stopped.

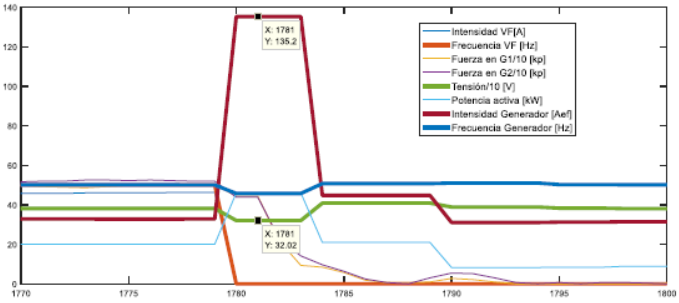

Figure. 1 Propeller with FC at maximum draft, direct starting of the 50 kW motor

If a hybrid system is designed and adapted to the work cycle of a small vessels, an improvement in the overall performance can be, thereby, obtain (less consumption, reduction of costs, reduction of emissions) [3] and in the performance of navigation and at dock [3].

The marine market is undoubtedly one of the sectors to benefit. There are several commercial opportunities for this sector, particularly in the labour market. Reaching up to four types of suitable vessels [3] for hybrid electric propulsion systems:

- In shore fishing boats,
- Short distance water taxis,
- Short haul ferries,
- Yachts

The design of the hybrid generation system (gas - electric) object of this study, is based on a test platform that feeds a group of three engines (two inshore of 26.4 kW and another offshore for propulsion of 22 kW), Besides, an electric brake is also used so as to provoke a large resistant torque value. In this sense, figure 2 a) and b) shows the test system.

a) Test platform b) Electric propeller (offshore)

Figure 2. Test platform. Hybrid gas-electrical power & propulsion

Lastly, it is convenient to note that the vessels operators of a hybrid-electric propulsion system require qualified personnel not only for maintenance but also in repair tasks, either on board or in the services near to their operational ports. This platform could contribute to being a training centre for personnel.

REFERENCES

[1] Giorgio Sulligoi, Andrea Vicenzutti, and Roberto Menis, All-Electric Ship Design: From Electrical Propulsion to Integrated Electrical and Electronic Power Systems. IEEE Transactions on Transportation Electrification, Vol. 2, no. 4, December 2016, pages: 507-521. DOI: 10.1109/TTE.2016.2598078

[2] Norbert Doerry, John Amy, and Cy Krolick. History and the Status of Electric Ship Propulsion, Integrated Power Systems, and Future Trends in the U.S. Navy. Proceedings of the IEEE, Volume: 103, Issue: 12, Dec. 2015. Pages: 2243 – 2251. DOI: 10.1109/JPROC.2015.2494159

[3] Nova Scotia Boatbuilders Association. Review of All-Electric and Hybrid-Electric Propulsion Technology for Small Vessels. 27th March, 2015. [on line]. [Query: 16 of march 2018]. Available in: http://www.nsboats.com/wp-content/uploads/2015/03/HybridTechnologyReview_NSBA.pdf

RESEARCH AND MANUFACTURING OF HIGH-MECHANICAL COPPER ALLOYS FOR SHAFT LINERS

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Keywords: copper alloy; shaft liner; intermetallic; abrasion resistance; heat treatment process.

HEADING

Shaft liners work in high wear; Therefore, it is necessary to research and manufacture high-strength copper alloys with good abrasion resistance. In this article, the studying presented the research results on the manufacture of high-mechanical copper alloys to replace the shaft liners. The shaft liner is made of aluminum-copper alloy which is alloyed with iron and nickel. With a rational heat treatment process, Fe_3Al phase - forming alloy improves the wear resistance of the alloy; hence, the life expectancy of the details can increase.

Introduction

Ship shafts usually are lubricated with natural water; This is an easily corroded environment, especially with electrochemical corrosion. In addition, the position where the shaft works with its bearing is subject to a large load. Therefore, to protect the shaft and create a good friction, it is often necessary to cover the steel shaft with a component called ship shafts.

Due to the special working conditions, the ship shafts must have a special mechanical property; that is resistance against abrasion. Some of these alloys are copper-aluminum alloys which are alloyed with iron and nikel.

Copper-aluminum alloy has some more highly mechanical and technological properties compared to other copper alloys. When it is alloyed with iron and nickel, durable phases are created, increasing durability by heat treatment.

Iron dissolves in aluminum very little; when iron content increases, it will form intermetallic phase Fe_3Al; if this phase is fine-grained in the form of spheres, and it distributes evenly in the microstructure, the mechanical properties of the alloy will be improved. Iron is a good element in the copper-aluminum alloys because it enhances the crystalline temperature, fine grain, durability, hardness and the wear resistance of the alloy. The intermetallic phase is generated around α, across the boundary and also inside phase β, preventing the phase differentiation of phase β and reducing the velocity of the reaction with eutectoid $\beta \rightarrow (\alpha+\gamma_2)$; Therefore, if the phase γ_2 is made, it is fine-grained and dispersed evenly throughout the structure, and it overcomes the self-composting phenomenon of aluminum-copper bar to improve durability, hardness and significant wear resistance for alloys as well.

Phase α of copper-aluminum alloys can dissolve up to 4% iron as the higher iron content produces the intermetallic phase Fe_3Al. Additional alloyed nickel can result in this compound with a lower iron content. Iron has a denaturing effect on the copper-aluminum alloys microstructure, improving durability, hardness, and lubricity along with reducing the tendency of embrittlement of 2-phase bromine due to slowing down the eutectoid decomposition of phase β and separation of phase γ_2.

Experimental procedure

In the results of the research group, the team made a copper alloy with 10% of Al; 4% of Fe and 2% of Ni. This alloy is heat treated to ensure its homogeneity at 850°C for 2 hours, then quenched in water and aging tempered at 350°C in 02 hours. The samples after treatment were analzed microstructure, hardness, and abrasion resistance.

Results and discussions

Analysis of the research results showed that:

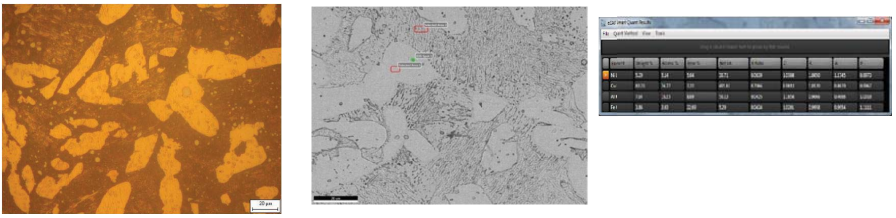

Figure 1. Microstructures and EDS

The microstructure image analysis revealed that the post-tempering sample showed that in the microstructure, phase α was observed with a fine-grained size dispersed on the background. These phases would contribute to increasing hardness and resistance against abrasion of the alloy.
EDS analysis showed the occurrence of intermetallic phases. These phases would contribute to increasing the hardness and resistance against abrasion of the alloy

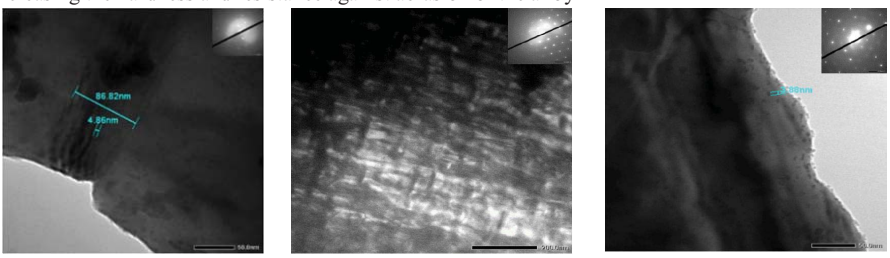

Figure 2. TEM and diffraction

TEM image analysis revealed the presence of fine-grained phases dispersed in the background. These phases increase the durability and wear resistance of the alloy.
Mechanical analysis showed that the sample after treatment, hardness temperature reached about 105HRB; the measured mass loss was 0,1044g.

REFERENCES

[1] A. Dorgan, Y. Havvatoglu; *Application of the infinitesimal deformation approach to the martensitic transformation observed in a Cu–Al–Ni alloy,* Physica B 327 (2003) 20–26.

[2] ***Mustafa Yasar, Yahya Altunpak,*** The effect of aging heat treatment on the sliding wear behavior of Cu-Al-Fe alloys, Materials and Design 30 (2009) 878-884.

[3] ***M.A. Suarez, R. Esquivel, J.Alcantara, H. Dorantes, J.F. Chavez;*** Effect of chemical composition on the microstructure and hardness of Al-Cu-Fe alloy; ScienceDirect, 2011, 917-923.

[4] ***H. Warlimont;*** Microstructure, crystal structure, and mechanical properties of martensite phases in copper alloys

[5] Yuanyuan Li, Tungwai Leo Ngai, WeiXin; *Mechanical friction and wear behaviors of a novel high-strength wear – resisting aluminum bronze;* Wear 197 (1996) 130-136.

[6] L.L.Gao, X.H. Cheng; *Microstructure and dry sliding wear behavior of Cu-10%Al-4%Fe alloy produced by equal channel angular extrusion*; Wear 265 (2008) 986-991.

STUDY ON THE EFFECT OF CHANGING HULL RESISTANCES TO TURBOCHARGERS OPERATIONS OF MARINE DIESEL ENGINE

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Keywords: *Hull Resistance, Turbocharger, Main Engine; Surging; Abrasion and Corrosion. unstability*

ABSTRACT

Hull resistances will be changing arcording to the time of ship operation, this is caused by many different reasons: The development of sea creatures clinging to the hulls; sea water corrosion and distortions of hulls; the abrasion and corrasion of propellers; the abrasion of driven shaft bearing etc… The changing of hull resistances we are able to consider that it is independance with the turbocharger of main engine operations. However imfact the changing of hull resistances will be effect to turbocharger operations. In this paper, we would like to study on the changing of hull resistances effect to turbocharger operations basic on the changing of hull resistance effect to power of main engine and then the power of main engine effect to turbochargers operations. For without decrease power of main engine in operation our research will support to select turbochargers of main engine suitable for power main engine and resistance of hull. Otherwise our research will advise to marine engineers who are operate main engine to understand reasons causing to unstablility and surging of turbochargers.

REFERENCES

[1] Kees Kuiken, “Diesel Engine II for ship propulsion and Power plans”, Target Global Energy Training Noorderhooidijk 29755 PJ ONNEN The Nertherlands, pp 40–75, (2008).

[2] Anthony F. Molland, “Maritime Engineering Reference Book” Butterworth – Heinemann Elsevier Ltd., pp 183 – 220, (2008).

[3] Professor C.D Rakopulos, Dr. EG. Giakoumis “Diesel Engine Transient Operation”, Springer-Verlag London Limited (2009).

[4] Hermann Hiereth, Peter Prenninger, “Charging the Internal Combustion Engine Power Train” SpringerWien NewYork (2003).

[5] V.Quan Phan, T.Phuoc Ho “The phenomenon surging of turbocharger compressor of marine diesel engine” The transport Journal (2011)

Shipping, Logistics and Traffic Management

DEVELOPMENT OF STANDARD ACCIDENT/INCIDENT ANALYSIS FORMS

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Keywords: Safety, marine accident, incident investigation, standardisation

INTRODUCTION

The complex structure of ship operations makes the occurrence of ship accidents inevitable, which might in effect critically damage the environment, the human life and the commodity. In accordance with IMO requirements, all marine incidents/accidents should be fully reported in a timely manner and should be analysed in order to prevent recurrence. All this process is performed according to shipping companies' procedures. However, the format and details of accident/incident analysis forms are quite different from each other and do not have a standard structure. In order to reveal this situation, accident/incident analysis forms used by eleven international shipping companies were examined. While some forms were as short as one page which is not practical for comprehensive investigation of complex marine accidents, some of them were designed in detail. So as to move one step further in accident investigation, it is a necessity to be standardized in the analysis of accidents/incidents just as the case in the standardization of accident reporting system.

In this research, it is aimed to fit the existing maritime accident/incident analysis forms to a certain standard to enable standardization. This research project is one of the winning proposals of IAMU Research Project for Young Academic Staff FY2018 and planned to run for a period from 1 May 2018 to 31 May 2019.

DESCRIPTION OF WORK

The principle project work in its whole consists of the following work packages:

WP1: Management strategies will be applied to ensure the quality and timely delivery of the project outputs.

WP2: The international regulations and standards on accident/incident analysis and the procedure implementation in shipping companies will be examined. Moreover, by using the scientific databases, a comprehensive literature review will be conducted to capture the academic point of view.

WP3: A working group of maritime company representatives operating different type of ships in international waters will be created to gather data.

WP4: The accident/incident analysis forms used by the shipping companies in the working group will be examined.

WP5: A workshop will be held to discuss how to structure the accident/incident analysis forms. The needs of the maritime sector will be captured. The issue of using different structure for different ship types will also be discussed.

WP6: Workshop output will be analysed. And a draft version of standard accident/incident analysis forms will be generated.

WP7: The 2nd workshop will be held to present the draft version of the study to the working group. The deficiencies will be discussed.

WP8: The final version of the standard forms will be generated. The study will be validated upon applying in maritime accident/incidents.

WP9: After the validation step, a guideline containing information regarding the standard forms will be prepared.

DELIVERABLES

This research will be a model to build current ship accident analysis forms into a standardized format and it will contribute to developing safety culture in maritime sector. It is predicted that the proposed study shall render certain contributions to academic literature. It will be a vanguard study in standardization in accident/incident analysis form in maritime shipping companies. Upon applying on maritime sector it is predicted to be validated to answer the demands of the sector.

Shipping, Navigation and Routing

RESEARCH ON NEW OBSTACLE AVOIDANCE ALGORITHMS FOR SHIPS

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Keywords: collision avoidance, safe trajectory, ship navigation.

INTRODUCTION

The contribution will report the progress of a research project for Young Academic Staff in FY2018. The project is dedicated to the development of a path planning module, constituting a part of an intelligent control system for ships - a Guidance, Navigation and Control system (GNC) [1], shown in Fig.1. The GNC system is composed of three main subsystems: the Guidance System, responsible for path planning, the Control System, responsible for motion control and the Navigation System, responsible for measurement of motion parameters (ship's positions and velocities). The basic component of the path planning module (the Guidance System) is called the Trajectory Generator (TG). An advanced optimization algorithm, constituting the core of the TG, calculates a safe, optimal path for a ship.

The aim of the research is the development of new, original, effective algorithms for the determination of a safe, optimal path for a ship in a collision situation at sea. The algorithms will be tested by carrying out simulation and experimental studies.

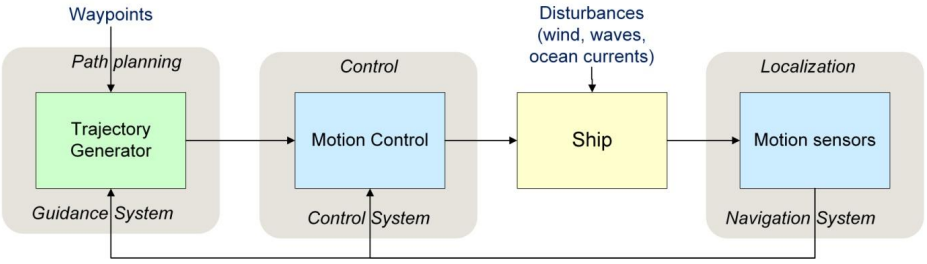

Figure 1. Guidance, Navigation and Control system.

SIMULATION STUDIES

One of the developed approaches uses a heuristic optimization method – the ant algorithm. The description of the developed method and the results were published in [2]. The second algorithm uses a deterministic optimization method, based upon an original approach of selecting the solution, which fulfils the restrictions, from the base of previously segregated trajectories [3]. The simulation studies will be carried out with the use of the MATLAB environment. Exemplary results for an encounter situation with eight target ships are presented in Fig.2.

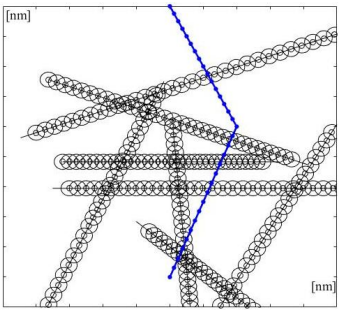

Figure 2. Encounter situation with eight target ships solved by the algorithm (own ship trajectory marked by blue line).

EXPERIMENTAL STUDIES

The developed ship's path planning algorithms, will be tested with the use of a systems composed of a group of mobile platforms and an Indoor Positioning System for localization of the moving objects. The results of experimental studies for situation with one dynamic obstacle in the environment are shown in Fig. 3.

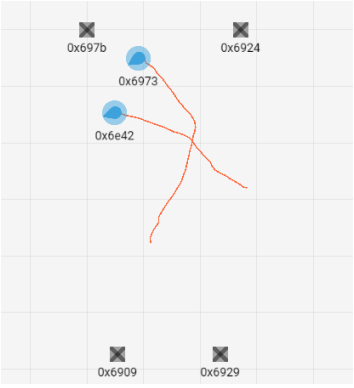

Figure 3. Results of experimental studies for an encounter situation with one dynamic obstacle registered with the use of an Indoor Positioning System.

RESULTS

The problem solving capability of the developed solution will be proven by its implementation in the GNC system and performed tests on board the research and training ship *Horyzont II* under operating conditions. The main goal of the presented research is the development of new path planning solutions for ships, which will contribute to achieve safer shipping and progress in autonomous navigation.

REFERENCES

[1] T.I. Fossen, Handbook of Marine Craft Hydrodynamics and Motion Control, John Wiley & Sons, Ltd, (2011).

[2] A. Lazarowska, “Ship's trajectory planning for collision avoidance at sea based on ant colony optimisation”, Journal of Navigation, Vol. 68 , pp. 291-307, (2015).

[3] A. Lazarowska, “A new deterministic approach in a decision support system for ships trajectory planning”, Expert Systems with Applications, Vol. 71, pp. 469-478, (2017).

THE ALGORITHM FOR FAST FORECASTING OF THE COLLISION DANGER DEGREE WITH SHIPS AND SURFACE OBJECTS IN THE E-NAVIGATION AREA

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1 INTRODUCTION

Keywords: algorithm, user interface, e-Navigation.

E-Navigation is a key initiative of IMO. E-Navigation is defined as «the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment» [1]. The functional features of alarming about the availability of the collision risk are still based on regular algorithms [2]. The proposed algorithm for fast forecasting is intended for a ship computer with the use of software by the e-Navigation system. The collision danger degree is recalculated every second and a visualization of fast forecasting is presented in 3 D format.

The task of the project is to create a fast forecasting algorithm for a ship computer, which is a component of the e-Navigation system

To provide duly assessment of ship's collision avoidance actions parameter as well as decision making regarding its danger or safety it is proposed to solve the task of two ships collision forecasting in the e-Navigation trial area. Lamberts equal azimuthal projection was used in the calculations [3].

So, the ship's movement in the coordinates system Oxy is described by the parametric equations

$$\begin{cases} x(t) = x^* + v_x t, \\ y(t) = y^* + v_y t, \end{cases} \quad (1)$$

where t — proposed, from the moment of observation t_0. The trajectory is set by the equation of the straight

$$Ax + By + C = 0, \quad (2)$$

where $A = v_y,\ B = -v_x, C = v_x y^* - v_y x^*$.

Conclusions

The target ship will cross the course line of the e-ship at the point $(0, \frac{C}{v_x})$. If $\frac{C}{v_x} > 0$ (C and v_x of the same index), then the cross point will be ahead on the course, if $\frac{C}{v_x} < 0$, then the cross point will be astern on the course. It will happen at the time moment $t = -\frac{x^*}{v_x}$. If $t > 0$, the cross time in future relating the time of observation, if $t < 0$, the cross time is in the past.

The target ship will cross the e-ship's abreast at the point $(-\frac{C}{v_y}, 0)$. If $-\frac{C}{v_y} > 0$ (C and v_y have different signs), the ship meets abreast on the starboard side, if $-\frac{C}{v_y} < 0$, then on the port side. It will happen at the time moment $t = -\frac{y^*}{v_y}$. If $t > 0$, then the cross time is in future relating to the time of observation, if $t < 0$, then the cross time in the past.

If $v_x x^* + v_y y^* \geq 0$, then the target ship moves away and is not in danger. Otherwise, the least distance to the target ship is equal to

$$d_{\min} = \frac{|C|}{\sqrt{A^2 + B^2}} = \frac{|v_y x^* - v_x y^*|}{\sqrt{v_x^2 + v_y^2}}.$$

It will happen at the moment $t_{\min} = -\frac{v_x x^* + v_y y^*}{v_x^2 + v_y^2} > 0$. The position of the least distance in the coordinate system with the static origin (that is, the point on the water surface) may be obtained according to (1):

$$\begin{cases} x(t) = x^* + t_{\min} \cdot v_x, \\ y(t) = y^* + t_{\min} \cdot (v_y + v_0), \end{cases} \quad (3)$$

Further it is intended to develop new augmented reality (AR) interface of a user for the visualization of the proposed decisions in the trial area of the ships having this system on board, without any distraction from the control of the real navigational situation (figure 1) [4]. In particular, it will give an opportunity to mark potentially dangerous targets by special markers of a definite colour (green – safe, yellow – attention, red – dangerous), which attract navigator's attention to make decisions.

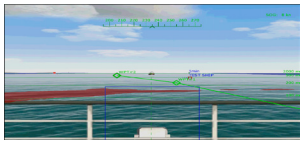

Figure 1. AR interface

REFERENCES

[1] IMO. *International maritime organization* [online]. London: IMO, 2018 [viewed date 16 August 2018]. Available from: <http://www.imo.org>

[2] A. Kondratiev VLCC's collision avoidance action while speed maneuvering with the use of PC, AUMSU. 2001.

[3] I. Semenov, Marine cartography. – L.:Morkniga. 1972. – 390 p.

[4] Burns, C.M. Hajdukiewicz J. Ecological interface design: Taylor & Francis, 2013

HUNTS POINT TERMINAL MARKET: THE DEMAND FOR WATERBORNE-TRANSPORTATION AS A PART OF THE OUTBOUND DISTRIBUTION SYSTEM

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Keywords: Hunts Point Terminal Market, Waterborne distribution, Produce, Waterborne, Waterway, Congestion

THEME: E, C

ABSTRACT

Daily food distribution in the New York Metropolitan Area is primarily by 15,000 trucks to and from Hunts Point Terminal Market (HPTM). These trucks on the roads increase congestion, pollution, and wear-and-tear of the roads. In turn, this increases the cost of living in the City, commute time, medical problems and cost, and reduces productivity.

The goal of the research is to explore a waterborne alternative to the existing primary use of trucks for outbound delivery or pick-up of food products in the New York Metropolitan Area from HPTM. The research explores the use of waterborne transportation as a part of the outbound HPTM distribution of the food system. The study quantifies the demand for waterborne services from which vehicle mile savings were determined. The envisioned vessel will be loaded with food products at HPTM and moved (self-propelled or pulled) to strategically located predetermined sites in the Metropolitan Area. Retailers or their agents will pick up their food products from these sites before the waterborne assets move back to HPTM.

The research methodology includes data collection and analysis. Since outbound distribution data is not available, the research team used a survey and primarily interviews.

The statistical analysis provides an estimated demand for the services by zip code. The estimates are used to establish a distribution pattern which becomes the foundation for food distribution to the NYMA in order to determine the direct and indirect impact of a waterborne distribution on the region. The amount of data collected indicates a 95 percent confidence level or better.

The research found that an outbound waterborne-transportation system moving produce from HPTM to

its consumers will significantly reduce the surface transportation traffic and emissions in NYC east of the Hudson River.

A fully operating waterborne system completely replacing the present surface transportation system, would have a net-effect estimate of:

- savings of 39,500 miles per day (10.3 million per year)
- emissions reduction of 37,300 pounds of carbon dioxide (CO_2) per day (9.7 million pounds a year)
- savings of 2,076 gallons a day (540,000 gallons per year and $1.35 million at $2.50 per gallon)
- savings of 1,000 to 1,500 hours of driving per day

The research indicate that there are challenges to overcome, including:

- The present operation system has minimal **trust** among HPTM wholesalers. Distrust stifles collaboration and pooling resources together.
- The present operation is dominated by small individual trucks with **on-demand** delivery schedules (24/7). Altering the schedule might present a problem. Furthermore, will the outbound-distribution system work with a one-hour pickup time?
- The present operation **includes produce rejection** with immediate and unconditional return to the wholesalers.
- The present delivery includes a **door-to-door** service from the wholesaler/broker to the retailer. Modifying the "**last mile**" operation might be a challenge for some wholesalers, retailers, and brokers.
- Presently the retailer can **spot order**. This ordering alternative will not be available in a waterborne operation. It might be supplemented with a vehicle delivery.
- The waterborne operation needs **high-volume** shipments to make the operation economically viable.
- The new landing sites for vessel discharge might raise Not-In-My-Back-Yard **concerns** because of increased traffic, noise, emissions, and other factors.
- The waterborne operation's inability to monitor **service quality and customer relations** between wholesaler and retailer creates a concern for some wholesalers.
- The **toll revenue** reduction from fewer bridge crossings might find objections from agencies that depend on those revenues.
- The **definition, role, and function** of the "Third Party Waterborne Delivery Provider" (3PWDP) proposed might be a concern to some wholesalers.
- The Coast Guard might require compliance with **security regulations** and public access permits at the landing sites.

The research recommends that an outbound, waterborne-distribution system is a challenge to develop but the benefits to NYC could be very visible by reducing traffic congestion, pollution, and wear-and-tear of roads and bridges. Indirectly an outbound waterborne distribution will also reduce the cost of living, commute time, and medical problems and costs, i.e., an increase in productivity.

Adopting and implementing an outbound waterborne distribution require stakeholders' (wholesalers, retailers, and government officials) cooperation and support. The challenges and complexities could be overcome with government leadership.

The implementation of an outbound waterborne distribution system should be gradual, starting in Brooklyn. Brooklyn has the appropriate facilities in place for this type of operation and, after the Bronx, it is the largest consumer of produce from HPTM.

Once the waterborne operation is fully operational, it will reduce the number of vehicles from the main roads and mitigate all associated negative externalities. However, there will be an increase in traffic in areas near the offloading location. The actual change of traffic patterns will be determined by the quantity of produce delivered, type of truck, and time of day.

The conclusions and recommendations for this preliminary study of the potential demand for waterborne outbound produce distribution from HPTM indicate that there are severe multiple challenges in developing an outbound produce distribution from HPTM to NYMA sites east of the Hudson. It is difficult to envision them resolved in the near future.

IMPLEMENTATION OF EMISSIONS ASSESSMENT INTO A SHIP ROUTING ALGORITHM IN A SHORT SEA SHIPPING ROUTE

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Key words: weather ship routing (WSR), emissions assessment, fuel consumption.

ABSTRACT

Maritime transport is one of the sources for global warming and environmental pollution. The environmental impact of shipping is expressed by atmospheric emissions as result of the combustion of fossil fuel emissions among other impacts as could be spills or underwater noise, for instance. Shipping accounted in 2012 for approximately 2.8% of global greenhouse gas (GHG, including CO_2, CH_4, and N_2O) emissions. Shipping is responsible for 15% and 13% of global NO_X and SO_X emissions respectively in 2012 ([1], [2]).

Moreover, it is estimated a growth in the world seaborne trade in the near future on account of world's growing population, which exacerbates air pollution forecasts from maritime transport. As a result, the IMO has developed and adopted more stringent regulations aimed to significantly decrease emissions from vessels. These air pollution regulations focus on reduction of CO_2, NO_X, SO_X and PM, since they are the main emissions of vessel engines.

Various measures and methods are proposed to reduce the environmental impact of shipping like slow steaming, the use of alternative fuels like hydrogen or LNG, or technical and design optimizations; although reducing fuel consumption points out as to be the major aspect for achieving shipping competitiveness. This agrees with an increase of the world tendency to reduce air emissions in the framework to mitigate the climate change effects. ([3])

From the shipping industry point of view this may be achieved with an optimum route plan design. Academic research has focused the ship routing optimization through pathfinding algorithms which take into account the meteo-oceanographic forecasts (i.e. wind, waves or currents predictions). Some of these contributions have been tested through a "proof-of-concept" based in oceanic distances. However, at relative short-distance the route shipping optimization remains unexplored. In this case, the spatial resolution of the meteo-oceanographic predictions is a severe restriction. ([4], [5])

The use of ship routing systems can lead to the reduction of fuel usage together with a reduction of costs. Consequently, a mitigation of carbon emissions could happen due to the avoidance of bad weather conditions. ([6])

The objective of this contribution is to implement emissions assessment into a ship routing algorithm in a relative short distance route (case study) using high-resolution wave numerical products. The ship routing will be defined as the development of an optimum sailing course and speed for ocean voyages based on nautical charts, forecasted sea conditions, and possibly the individual characteristics of a ship for a particular transit.

This research will deal firstly with identifying the parameters which are required for energy consumption and emissions on board presently. A theoretical fuel consumption can be calculated

by using the energy related parameters in energy and mass balances following from diesel engine theory. One or more parameters could serve as proxy which presents information about the fuel consumption of a vessel without presenting the direct fuel consumption. Subsequently, an inventory of methods to calculate fuel consumption and/or CO_2 emissions will be elaborated. Finally, the potential best suitable method will be assessed by combining the monitored parameters and the method inventory. The aforementioned method will be found by assessing if the relevant parameters already are monitored/available on board for the reviewed methods, by ranking of methods by scoring for its feasibility costs, accuracy, implementation and by the outcome of each method in relation with research objectives.

Once the most suitable method is chosen, a real scenario will be analysed by means of introducing the required data on current ship routing algorithm.

The obtained new knowledge will help to bring at local scale to an unprecedented level of resolution of weather ship routing (WSR) and, furthermore, the expected results will reflect the benefit of using WSR systems at relative short distances and its impact on fuel consumption benefits, and the reduction on emissions.

REFERENCES

[1] IMO, "*Third IMO Greenhouse Gas Study 2014*", London: International Maritime Organization, (2015).

[2] CE Delft, Germanisher Lloyd, Marintek, Det Norske Veritas, 2006; IMO, n.d.-c, n.d.-k, 2014b

[3] Psaraftis H.N. and Kontovas C.A., "Speed Models for Energy-Efficient Maritime Transportation: A Taxonomy and Survey", Transportation Research Part C: Emerging Technologies, Vol. 26, (2013), pp 331-51.

[4] Grifoll, M. (2016). Ship routing applied at short sea distances. Proceedings of 7th International Conference on Maritime Transport, Barcelona. ISBN: 978-84-9880-591-8

[5] Walther, L., Rizvanolli, A., Wendebourg, M., Jahn, C. (2016). Modeling and Optimization Algorithms in Ship Weather Routing. International Journal of e-Navigation and Maritime Economy 4 (2016) 031 – 045

[6] Vettor,R. and Guedes Soares, C. (2015). Influence of ship routes on fuel consumption and CO_2 emission. Maritime Technology and Engineering – Guedes Soares & Santos (Eds). Taylor & Francis Group, London, ISBN 978-1-138-02727-857

INVESTIGATION OF GROUNDING ACCIDENTS IN THE BAY OF IZMIR WITH THE APPLICATION OF ROOT-CAUSE ANALYSIS INSTRUCTIONS

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Keywords: Bay of Izmir, Root-Cause Analysis, Grounding, Ship, FTA.

INTRODUCTION

There are many reasons for the accidents resulting in the grounding of the ships. The main causes of these accidents are human error, equipment failure and heavy weather conditions [2,4,5,6]. In this study, it is aimed to determine the root causes of the ship accidents in Bay of Izmir, where groundings are frequently experienced.

MATERIALS and METHOD

In this study, the FTA method as one of the most commonly used risk assessment technique was carried out to investigate probability of root causes and their impact level on grounding accidents in Izmir Bay.

FTA method

Fault Tree Analysis (FTA) is deductive risk analysis in which an undesired event is analyzed using Boolean approach to integrate a series of sub events. The FTA method is utilized both for qualitative and a quantitative purpose.

Study Site

Bay of Izmir as one of the most important waterway for the oceangoing vessels carrying huge amount of cargo to the Alsancak Port as a seaport integrated with commerce and industry.

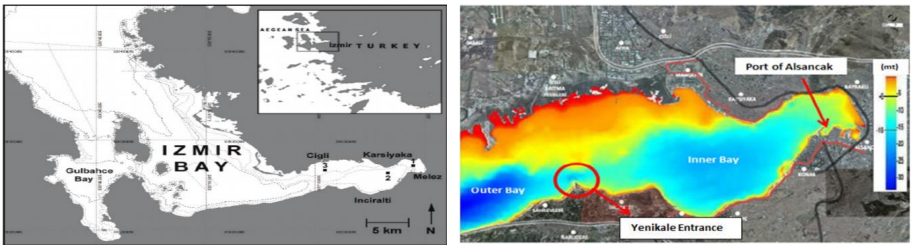


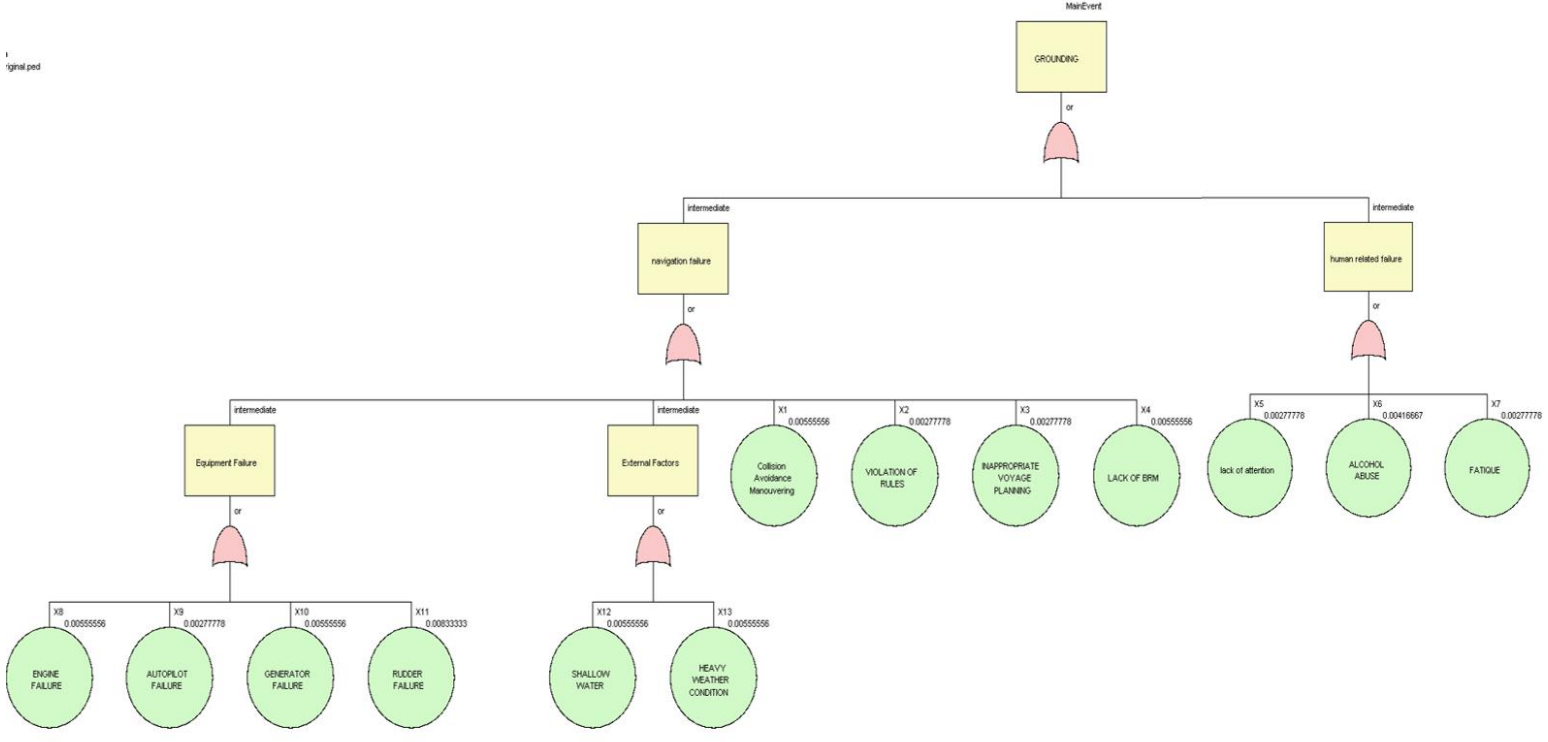
Figure 2: Study area map: bay of Izmir, Turkey.

Source: [15]

Findings and Results

In this study, the grounding accidents in Izmir Bay were considered for evaluation. A total of 24 events caused by 13 factors were determined. “Rudder Failure” is the most important factor and has the biggest contribution in grounding accidents. “Lack of BRM” and “Shallow Water Conditions” are the second and the third important factors in accidents. It is also seen that accidents caused by equipment faults frequently occur. In addition, although the bay is located in a natural protected area, bad weather conditions nevertheless caused grounding. Again the results show that the effect of human error on accidents is lower than the others. Besides, many boats engaged in fishing in the area and their captains who do not know the rules of Colreg cause the ships to ground. As well as other types of boats causing accidents due to lack of information on restricted passage conditions for ships.

Figure 3: Fault tree for grounding accidents



CONCLUSIONS

In this study, a total of 24 grounding accidents in the Bay of Izmir between 2001 and 2016 have been investigated. It has been resulted that ship accidents, which result in grounding due to geographical constraints of the region, are frequently experienced. Therefore, it is aimed to determine the precautions that should be taken in order to prevent these accidents from happening again.

In this study, it is seen that the most important factor in the accidents is the rudder failure under equipment fault. Although these failures seem to be caused by malfunctions on their own, it is known that the inadequate maintenance measures may also cause this fault. In both cases, regular maintenance operations should be carried out and inspections should be conducted by authorities.

Especially due to the limited maneuvering area in the region, it is impossible for the vessels in emergency to make grounding avoidance maneuvers. In this context, some precautions both for geographical limitations and other factors should be taken in order to prevent grounding accidents. For short term solution it is suggested to carry out a dredging operations in order to extend of the maneuvering area for safety of navigation. On a long-term basis, some precautions can be taken for the Gediz Delta, which causes the bay to be shallow.

REFERENCES

[2] Akten, N. Shipping accidents: a serious threat form marine environment. In: *Journal of the Black sea/Mediterranean environment.* 2006. 12 (3). 269–304.

[4] Acar, U. and others. Collisions and groundings – major causes of accidents at sea. Marifuture papers. 2008. 48–51. [viewed date 12 May 2018]. Available from: http://www.marifuture.org/Publications/Papers.aspx.

[5] Kılıç, A. and Sanal, H. T. Çanakkale boğazi'nda karaya oturmayla sonuçlanan gemi kazaları. In: Journal of *Balıkesir Üniversitesi Fen Bilimleri Enstitüsü*. 2016. 17(2). 38-50.

[6] Papanikolaou, A. and others. Casualty analysis of Aframax tankers. In: *J. Engineering for the Maritime Environment*. 2007. 221(2). 47–65.

[15] Toz, A. C. and Koseoglu, B. Trajectory prediction of oil spill with Pisces 2 around Bay of Izmir, Turkey. In: *Marine pollution bulletin*. 2018. 126. 215-227.

THE APPLICATION OF MATHEMATICAL MODELS AND SIMULATIONS IN THE FEASIBILITY STUDIES OF SHIP MANOEUVRING

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Keywords – ship mathematical modelling, ship manoeuvring, bridge simulator, simulator assessment, applied research

1. Introduction

It is obvious that the development of modern bridge simulators nowadays provides an advanced tool for maritime training. Apart from the educational function, the simulators can be exploited for the feasibility study of ship manoeuvrability for existing ports, ships under operation as well as ships, ports and locks in the design phase. Thus, it is necessary to set up proper ship mathematical models and establish a scientific process for assessment of ship manoeuvring in simulators.

2. The aim of the study

This paper aims to systematically introduce mathematical modelling and proposes a method to assess the ship manoeuvring in six degrees of freedom and in real-time mode. The mathematical model and assessment method were used in applied research projects which have been practically conducted by the study group during the research period.

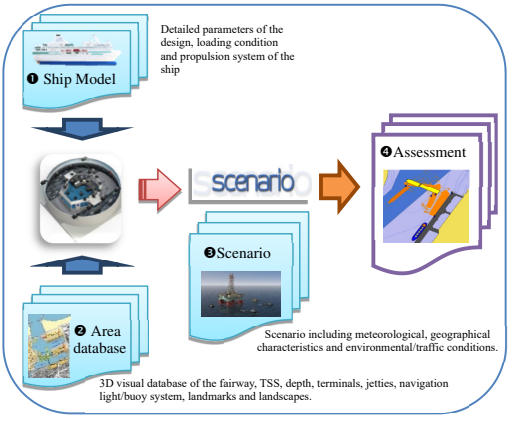

Figure 1. The process of the modelling and manoeuvrability assessment of a ship

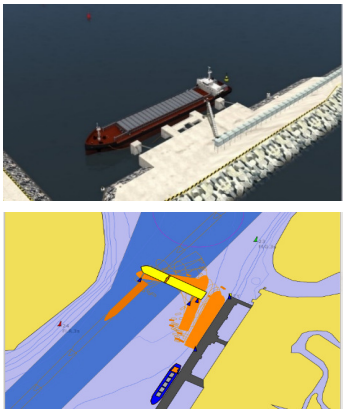

Figure 2. Plotting and 3D view of a ship simulator test

3. Application of the study

During the period of study from 2016 to 2018, the group of author conducted several applied researches for assessing the ship's manoeuvring ability and feasible design of ports and fairways, traffic separation scheme (TSS) with the use of full mission bridge (FMB) simulators of the Maritime Education and

Human Resource Centre, the University of Transport, Vietnam and the advanced Kongsberg's K-Sim simulator platform of the Maritime Centres of Excellence (SIMWAVE), the Netherlands. The study projects were involved and cooperated with many international organizations including port authorities, pilot companies, port designers, shipowners, shipbuilders and tugboat companies as well. This study also summarizes and introduces briefly the results of the applied researches.

REFERENCE

1] AVIDSON, K.S.M. and L.J. SCHIFF, *Turning and Course-Keeping Qualities.* Society of Naval Architects and Marine Engineer, New York NY, 1946.

[2] Kiokai, J.o.Z., *On the steering qualities of ships.* Journal of Zosen Kiokai, 1957. 1956 (1956)(99): p. 75-82.

[3] Norrbin, N., *Theory and observations on the use of a mathematical model for ship manoeuvring in deep and conned water*. 1971, Swedish State Shipbuilding Experimental Tank, Technical Report 63.: Gothenburg.

[4] S., I., et al., *A practical calculation method of ship manoeuvring motion.* International Shipbuilding Progress, 1981. 28, No. 325: p. 207-225.

[5] Eda, H., *Maneuvering performance of high-speed ships with effect of roll motion.* Ocean Engineering, 1980. 7(3): p. 379-397.

[6] HIRANO, M., *A Practical Calculation Method of Ship Maneuvering Motion at Initial Design Stage.* the Society of Naval Architects of Japan, 1980. 147: p. 68-80.

[7] P., O. *Roll – An often neglected element of manoeuvring, Proceedings*. in *International conference on Maritime Simulation and Ship Manoeuvrability MARSIM '93*. 1993. St. John's, Newfoundland, Canada.

[8] Ankudinov, V.K. *Simulation Analysis of Ship Motion in waves*. in *International Workshop on Ship and Platform Motions*. 1983. University of California at Berkeley.

[9] Hooft, J.P. and J.B.M. Pieffers, *Manoeuvrability of frigates in waves.* Marine Technology, 1998. 25(4): p. 262-271.

[10] FOSSEN, T.I., *Handbook of Marine Craft Hydrodynamics and Motion Control*. 2011, Norway: Norwegian University of Science and Technology Trondheim, John Wiley & Sons.

[11] Zaikov, S. and D. Nikushchenko, *Mathematical Model of Ship Dynamics*. 2016: Kongsberg Maritime.

[12] KOROTKIN, A.I., *Added Masses of Ship Structure.* Marine Technology, 1988. 25: p. 262-271.

[13] KORNEV, N., *Lectures on ship manoeuvrability*. 2013: Rostock University.

[14] JOURNÉE, M.J. and J.M.J. ADEGEEST, *Theoretical Manual of Strip Theory Program "SEAWAY for Windows"*. 2003, the Netherlands.: Delft University of Technology.

[15] Clarke, D., *A two-dimensional strip method for surface ship hull derivatives: comparison of theory with experiments on a segmented tanker model.* Journal of Mechanical Engineering Science 1959-1982, 1972. 1-23.

[16] Sen, D.T. and T.C. Vinh. *Determining Hydrodynamic Coefficients of Surface Marine Crafts*. in *International Conference on Maritime Science and Technology 2016 (IAMU AGA17)*. 2016 Hai Phong: Vimaru.

[17] SOBOLEV, G.V. and K.K. FEDYAYEVSKY, *Control and Stability in Ship Design*. 1964, Washington DC: Translation of US Dept. of Commerce.

[18] P., C.D., H. G., and G. P., *The Application of Manoeuvring Criteria in Hull Design Using Linear Theory.* The Royal Institution of Naval Architects, 1982.

[19] Lee, T.I., *On an Empirical Prediction of Hydrodynamic Coefficients for Modern Ship Hulls.* MARSIM'03, 2003.

[20] Katsuro Kijima, Y.N., *On the Practical Prediction Method for Ship Manoeuvring Characteristics.*

[21] Sen, D.T. and T.C. Vinh. *Mathematically estimating hull resistance forces of ships in six degrees of freedom*. in *The 16th Annual Conference of the Asia Maritime & Fisheries Universities Forum (AMFUF 2017)*. 2017. Ho Chi Minh city.

IAMU STUDENT TECHNICAL SESSIONS

Energy efficiency in maritime transport

AUTOMATIC IDENTIFICATION SYSTEM DATA IMPLEMENTATION TO A WEATHER SHIP ROUTING

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Keywords: Weather ship routing, AIS, optimum routes.

ABSTRACT

This paper tries to explain the project that aims to use Automatic Identification System (AIS) data in ship route plotting systems with the intention to analyse current Short Sea Shipping routes and be able to compare them to optimized routes and support this comparison with weather reports. The study will be carried out using the path finding algorithm SIMROUTE which uses meteorological and oceanographic predictions as input data for the optimized routes, a route plotting software to create routes from waypoints obtained on an AIS platform and a platform to visualize weather reports from official sources. In previous works, having compared the shortest distance with the most efficient distance in strong wave situations gave, to the research, the conclusion that the direction of the waves in relation to the ship's course has a significant importance for the optimum route, with improvements in the safety and economical domains when energetic wave episodes occur. Ship routing systems have been used in research on inter-oceanic routes as an effective solution to reduce sailing time, mitigate carbon emissions and in order to improve maritime safety.

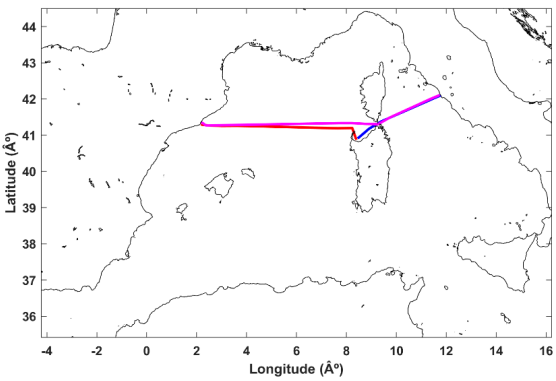

Figure 1 - Cruise Barcelona's route

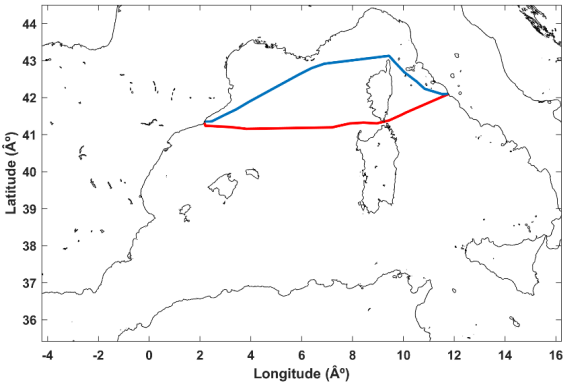

Figure 2 - Cruise Barcelona's route in strong wave episode

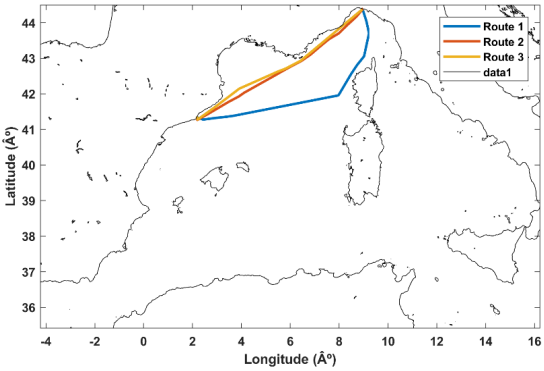

Figure 3 - Excellent's routes depending on the weather

As shown in these figures, with this method it is possible to display and monitorise current routes. Therefore, it enables the evaluation of how ship routing applies to given routes once implemented.

REFERENCES

[1] M. Grifoll, M. Castells and F.X. Martínez de Osés, "Enhancement of maritime safety and economic benefits of short sea shipping ship routing" Proceedings of SEAHORSE 2016, International Conference on Maritime Safety and Human Factors, (2016).

[2] M. Grifoll, F.X. Martínez de Osés, "A Ship Routing System Applied at Short Sea Distances". Journal of Maritime Research, (2016).

[3] Ll. Basiana, "Study of the feasibility of the ship-weather routing algorithm Simroutev2 on short sea shipping" Bachelor's degree thesis, (2017).

EFFICIENCY OF ENERGY IN MARITIME TRANSPORT

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Keywords: Energy efficiency, Marine environment, Air pollution, Greenhouse gases, Energy Efficiency design Index.

ABSTRACT

As the world's only reliable, global, cost-effective and energy-efficient mass transportation method for energy, materials, foods and products, maritime transport is central to sustainable development. And the maritime transportation system itself must, therefore, ensure that its development is also sustainable. The growing demand for transportation results in increased energy usage and emissions, affecting public health, Economy and the environment. It is essential to extend short-sea shipping in the EU in order to reduce the pressure on existing onshore infrastructure and to achieve emission targets. There are no simple solutions for reducing shipping pollution – a radical energy efficiency approach is called for. With the growing concerned over greenhouse gases and consumption of fossil fuels, the maritime industry governing body IMO has already taken positive steps by implementing Energy Efficiency Design Index which will monitor the amount of CO2 and other greenhouse gas emissions from ships.

The development of shipping transportation industries is associated with the environmental pollution. One of the main factors from Greenhouse Gases (GHGs) emission is carbon dioxide (CO2). carbon dioxide (CO2) emissions from shipping are currently too huge that almost emits around 1000 million tons of CO2 annually and is responsible for about 2.5% of global greenhouse gas emissions, and they are predicted to increase between 50% and 250% by 2050 – depending on future economic and energy developments This is not compatible with the internationally agreed goal of keeping global temperature increase to below 2°C compared to pre-industrial levels, which requires worldwide emissions to be at least halved from 1990 levels by 2050. Ships' energy consumption and CO2 emissions could be reduced by up to 75% by applying certain energy consumption methods.

Lowering energy consumption helps to reduce carbon dioxide (CO2), sulphur oxides (SOx) and nitrogen oxide (NOx) emissions because of reduced load on the vessels diesel generators. A single average size seawater cooling pump can save $29,000 and 117 tons of CO2 per year. When applied ship-wide and fleet-wide these savings can be tremendous. The reality for the marine industry is that cost-efficient technology to save energy exists; it is just not being implemented rapidly enough. The result is that the industry faces an energy-efficiency gap. Researchers have found the reasons for the slow uptake of new technology are organisational failure, lack of time

and shortage of competence. There is often no long term energy strategy with energy issues being given low priority.

SEEMP is ship specific plan which can be efficiently implemented on vessels. The Marine Environment Protection Committee (MEPC) of the IMO has prescribed certain technical considerations and measures for reducing the CO2 emissions, with an agreed timetable for adoption. This is what comprises the Energy Efficiency design Index (EEDI) which is on the verge of being enforced soon.

This paper will discuss the problem concerns of ship's gases emission and how it affects the marine environment, and the different ways to incentivize energy-efficient ship operations to encourage faster implementation of energy-efficiency measures and the inculcation of an energy-efficiency culture, which lies at the heart of a sustainable maritime transportation system. In the future of the maritime industry, its expected to have a new vessel design that fits the "targets" of EEDI and will not be justified unless energy efficiency is monitored and balanced during the operational life of the vessel too.

EMISSION INVENTORIES FOR SHIP OPERATIONS: METHODOLOGICAL COMPARISON WITH ON-BOARD MEASUREMENTS

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Keywords: Keywords: Emission inventory, Ship transport, accurate estimation, On-board measurement.

ABSTRACT

With global vessel fleet numbers anticipated to rise, the trend in maritime operations is projected to rise as well. This poses problems, as shipping emissions can pose human-health related and environmental dangers but maritime operations are not currently subject to the stringent requirements applied to land transport, including adherence to existing laws and policies, with amendments for emission-associated regulations. As shipping-inventory related approaches associated with emissions can be unpredictable, this study seeks to determine ways to estimate the emissions produced by ships with accuracy, through use of an appropriate methodology and its practical application to measure emissions aboard a 27198 GRT heavy hauler.

This will be done by analysing the measured emission discharges from the main engine (ME) of a slow speed diesel (SSD) with a 6880 kW capacity as the ship moved across the berth. The medium speed diesel (MSD) fitted with an auxiliary engine (AE) for the second set of measurements. Emission discharges were about 465 kW. To produce verifiable and unbiased results, a general prediction methodology is applied to analyse emissions primary gases and particulate matter. The results obtained are then compared with different standards and methodologies. Of the three operation modes considered i.e. at berth, manoeuvring and cruising, the results of the USEPA methodology are the closest, suggesting the precision of the methodology. The results should help upgrading the relevant policies regarding the application of the emission inventories.

EVOLVE ALWAYS, BUT IN A CONTROLLED AND CAREFUL WAY

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Keywords: Evolution, globalization, maritime sector future.

Conditions have improved considerably since the beginning of the maritime sector as a means of transport, both for passenger ships and merchant. Security and prevention measures have been implemented over the years. Due to international agreements between different countries, it has been possible to regulate practically all the ships that navigate at sea. It is a global success, the way in which countries have committed to comply with the regulations of those ships that fly their flag. The result is an efficient, safe and considerably fast means of transport in relation to the distance and quantity of goods that a single ship can transport.

It is true that on many occasions we have reacted late. For years the human being has worked with the trial and error method. We try something new and if it works it is maintained, if it fails it is replaced by something improved. It is a very effective method of progression, yet not perfect. Ships were not forced to build subdivisions on their hull until the SOLAS was created in 1914 after the Titanic sank. It was not mandatory that the ships had a double hull until the collapse of the "Exxon Valdez" in the year 1989. These are some examples of measures that nowadays can be obvious and essential for the safety of the ship. At the time nobody thought of implementing them.1

Almost 30 years ago people brought into their daily lives the use of World Wide Web, something that revolutionized the world. The ease and quick way of obtaining infinite information allows the world to make spectacular progress. You can understand the functioning and way of organizing of humans just with a computer and internet connection. The continuous appearance of new technologies opens an immense network of opportunities that should be exploited. The International Maritime Organization (IMO) and the regulatory agencies of the maritime sector have the obligation to study every possible option. Nowadays it is not enough to try something, you need the assurance that it will work and that it will do it in the best way. Why so much demand? Because we have the knowledge and technology to foresee and simulate all the possible situations that may appear. We must, therefore, understand the way in which the world works now and adapt to it.

IMO has been an example for the rest of international institutions from its creation to the present. It has been able to overcome any crisis. The founding countries, aware of the important role of the maritime sector, have been able to work together to legislate and regulate such a complex activity. The maritime safety committee, formed by all its departments (legal, maritime protection, technical competition, auxiliary organs ...); It is responsible for proposing and studying new regulations later analyzed by the Council and approved by the Assembly. It is a long process, and where every detail is examined in depth. It is a job, as discussed above; that IMO has developed with excellence. The willingness of the countries concerned and the great work done jointly by thousands of workers around the world came to fruition. In the coming years new and revolutionary technologies will probably appear and they may completely change the way maritime transport works today.

As we all know, accidents in maritime world have decreased over the last decades. However, nowadays we still have some incidents, and it is being really hard to end with all of them. Ironically, we are the main reason. Humans are the first cause of all the accidents. A report made by the Allianz company showed that, human factor causes around 75% of the accidents in the sea. As human beings as we are, it is reasonable that we are going to make some mistakes. IMO's job passes through prevent and minimize these possible errors we can make. Since one of the most common causes was falling asleep in the bridge, some ships decided to add a 12 minutes button-alarm to prevent it. 2

This should not be a problem if as up to now decisions are not made hastily. We can fall into the dangerous and uncontrolled world that surrounds the internet. Social networks, news, politics, many businesses ... live and need to use constantly this network of global connections. The shipping industry, already established around the world, should not take any risk. It simply requires understanding the strictly necessary measures and implementing them in the way that has been done until now. Evolve always, but in a controlled and careful way. It is the best way in my opinion to guarantee that everything will still working.

It is possible to read in the currently newspapers some revolutionary ideas about the way that marine sector is taking. Few of them assure that we will have autonomous ships in five years. A Chinese company called Oceanalpha is working in a 50 meters length ship fitted with an electrical motor and with no need to have a crew on board. The truth is that all this kind of new technology will need years of tests and regulations before it could be completely implemented. We are making very big steps in our progress, and looks like they are being in the proper way. Focusing our efforts on useful things will make this sector even stronger. Invest in technology, pollution reduction and efficiency.3

Finally, I would like to foreground again the exceptional work that IMO performs in all its competences. After months of study, in which I researched the methodology and international agreements issued during its beginnings to the present; I have no doubt in what will be the way to organize the countries in the future. We live in an increasingly globalized world where decisions must be made at the international level and not at the national level. What would happen if each country would have its own security convention? Making regulations and decisions globally makes lots of processes easily. For this reason IMO has been capable of solving and facing in an efficient way most of the troubles that have appeared. We are one step ahead to many other sectors. How is the world going to work in current economics, migration and political problems with national measures? We must be an example for all those sectors that still do not have this way of working and thinking. Letting us know and explain the way we work to many others can result in an advance to other areas that would end up benefiting us all.

[1] Alan Khee-Jin Tan, Vessel-Source Marine Pollution: The Law and Politics of International Regulation, pp. 139, (2005).

[2] Jaime Rodrigo De Larrucea, Seguridad Marítima, pp. 10-15 (2015).

[3] M. Sandri, Piergiorgio, El barco fantasma se hace realidad, "La Vanguardia", (02/06/2018).

ENVIRONMENTAL IMPACTS OF ELECTRIC FERRIES IN AUSTRALIA

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Keywords: Alternative charging solutions; Environmental impacts; Electrical ferries; PESTEL analysis; Social impacts

ABTRACT

Many commuters see the ferry ride as a different and pleasant experience compared to other types of transportation modes. Moreover, ferries carry economic, environmental and historic significance and provide critical service to communities, especially for avoiding congested roads (Hartogh, 2010). Nevertheless, with the steady growth of ferry commutation the emissions from ferries are becoming prominent. With the concept of low carbon economy, emerging trends for energy efficient technologies and overwhelming concerns for protecting the environment, the ferry industry is also experiencing growing pressure to adopt greener solutions (United Nations, 2013). One such solution is the replacement of conventional diesel engine powered mechanical propulsion systems with battery powered electric propulsion systems.

Many countries have already started to build ferries with battery systems enabling them to be powered electrically. Norway is leading the way with the introduction of an electrically powered ferry named "Ampere" in 2015 (Nordregio, 2016), with Denmark taking major steps to follow suit (Siemens, 2016). Hong Kong's diesel powered ferries are major contributors to the pollution caused at Victoria Harbour according to the Environmental Protection Department. Therefore, with the help from Norway, Hong Kong is planning to replace the diesel engines with zero emission batteries starting with the Star Ferry (Karacs, 2016).

With many countries already having success with battery powered ferries, it begs the question as to why there are no electric ferries operating in Australia? Although there is no clear answer, a possible reason is that since Australia maintains a good standard when it comes to clean air quality, the emissions from ferries are far less compared with the other modes of transportation as shown in Figure 1. Emissions coming from light vehicles such as diesel and petrol cars are extremely high. This compelled the Australian government to bring in electric cars as a solution to cut down emissions and as a result vehicles such as Toyota Prius and Tesla Model X are currently in demand (Climate Works, 2016). Eventually when the demand for ferries starts to grow so will the emissions of greenhouse gases. This will prompt the government to introduce battery powered ferries in Australia in the future.

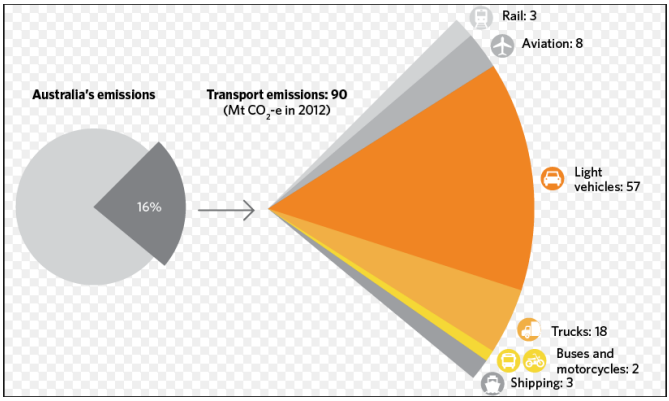

Figure 1: Emissions from different modes of transportation in Australia (Australian Government, 2014)

A conventional diesel powered ferry with a 250kW diesel engine and 1800 hours runtime per year will consume 120m^3 of diesel. The resultant emission per annum will be in the range of 300 tons of CO_2, three tons of NO_x and 150kg of PM particles. In contrast, electrically driven battery powered ferry will have no such emissions. The energy efficiency of electric ferries is around 91 percent compared to 28-35 percent efficiency of diesel engines and thus operation savings could be significant (Keith Barry, 2014). Another significant factor is that there is no noise pollution, meaning the battery powered ferries disturb the surroundings as little as possible.

Due to this low emission and low noise pollution, battery powered ferries could be a prudent investment in Australia. In order to achieve the aforementioned aim, the Bruny Island ferry service located in the South Eastern coast of Tasmania, has been taken as the case study in this paper. The Bruny Island is separated from the Tasmanian mainland with the east coast lying within the Tasman Sea. The island is about 50km long but appears to be two islands with North and South Bruny joined by a narrow strip of land called “The Neck”. The ferry service will go back and forth operating from Bruny to Kettering taking approximately 20 minutes to berth at one end from the other.

This paper is broken into several subtopics to fulfil the aim discusses in the above paragraph. The motives for introducing battery powered electric ferries in Australia are discussed in detail in Section 2. Section 3 presents recent developments and the future trends in electric ferries worldwide. Alternative sources of generating electric power to ferries are examined in Section 4. Drawbacks in introducing the electric ferries to Australia (especially in Tasmania); are presented in Section 5. Finally, conclusions drawn from this study are laid out discussing the eventual findings and thoughts of establishing the electric ferries in Tasmania as well as in other parts of Australia.

REFERENCES

[1] United Nations. (2013). Sustainable Development Challenges. *World Econmic and Social Survey 2013*.

[2] Hartogh, H. F. A. d. (2010). *The other side in sight.* Erasmus Univerity of Rotterdam.

[3] Nordregio. (2016). Ampere. The world's first electric ferry

[4] Karacs, S. (2016). Norwegian- made electric ferries 'could reduce pollution in Hong Kong's Victoria Harbour'. *South China Morning Post*.

[5] Climate Works. (2016). The Path Forward For Electric Vehicles in Australia.

Human element

COMMON HEALTH PROBLEMS AMONG FILIPINO SEAFARERS

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Abstract

Keywords: Common health problems, causes, coping mechanism, and Filipino seafarers.

INTRODUCTION

Generally, Filipino seafarers are aware of the dangers of stress and diseases that can be acquired on-board the ship. Excessive stress usually develops illness. Men sometimes hide their emotion. Men are generally not allowed to cry. That is why more men suffer from cardiovascular disease which is an offset of excessive stress. Some factors such as recruiting seafarers from countries where certain infectious diseases are endemic without conducting proper pre-recruitment medical examination, sexual behavior on board, intravenous drug abuse, living in close proximity to infected carriers, use of unhygienic food and water obtained at ports of call for consumption on board can still, cause infectious diseases among international seafarers.

STATEMENT OF THE STUDY

The study was conducted to identify and describe the common health problems, causes, and coping mechanism among Filipino seafarers onboard in domestic and international ships.

Respondents of the Study

The respondents of this study were the fifty (50) seafarers of JBLFMU who enrolled in the Training Center of JBLFMU. The respondents were further classified to different categories as such as number of years at sea, age, occupational section on board, and status.

RESULTS

The common health problems of the seafarers in this study as an entire group are the following: (1) tiredness (f= 32, 64%), (2) headaches (f = 18, 36%), (3) disturbed sleep (f = 15, 30%), (4) musculoskeletal disorders (f =11, 22%), and (5) excessive anger (f =9, 18%) respectively.

The following causes of common health problems are: (1) homesickness (f = 33, 66%), (2) work pressure (f = 20, 40%), (3) overworking (f = 18, 36%), (4) due to toxic chemicals (f = 15, 30%), (5) carelessness (f = 12, 24%) respectively.

Coping mechanisms of Filipino seafarers are: (1) praying (f = 40, 80%), (2) constant family communication (f = 31, 62%), (3) use of social media (f = 27, 54%), (4) time management (f = 20, 40%), (5) engagement of leisure pursuit (f = 17, 34%) respectively.

No significant differences in the causes of health problems of the respondents when classified according to number of years at sea ($t = .349$, $p > .05$), age ($t = -.234$, $p > .05$), and occupation ($t = -.838$, $p > .05$).

Significant difference existed in the health problems of the respondents when classified according to occupation ($t = -2.036$, $p < .05$). This means that the selection of profession could influence the respondents health related problems. The marine engineers are vulnerable to health related problems as reflected in their mean scores (M = 3. 3505) compared to nautical or deck officers because marine engineers are exposed often to lubricants, fuels, oils, and some other fuels additives that may cause health problems and irritations.

REFERENCES

[1] Baird Maritime Industry. (2009). *The mental health of foreign seafarers*. Retrieved November 15, 2010 www.bairdmaritime.com/index.php?option=com_content&view=.

[2] Dimayuga, R. (2008). The Social Identities of Filipino Seafarers, *APMJ.* Vol. 17 (1), fromhttp://www.smc.org.ph/apmj/apmj_details.php?id=81.

[3] Friedman, H.S., & Silver, R.C. (Eds.) (2007). *Foundations of Health Psychology*. New York: Oxford University Press.

[4] Kiehl, J.T. (2005). *The Phenomenological Experience of Depression.* http://www.cgjungpage.org/index.php?option=com_content&task=view&id=638&Itemid=40. Retrieved January 27, 2011.

[5] Kiehl, J.T. (2005). *The Phenomenological Experience of Depression.* http://www.cgjungpage.org/index.php?option=com_content&task=view&id=638&Itemid=40. Retrieved January 27, 2011.

[6] Pallasmaa, J. (2010). Lived Space. Embodied Experience and Sensory Thought. http://www.tu-cottbus.de/theoriederarchitektur/Wolke/eng/Subjects/011/Pallasmaa/1Pallas.htm retrieved January 27, 2011.

[7] Sayedfatemi, et al.(2007). *Experienced stressors and coping strategies among Iranian seafarers.* Retrieved October 16, 2010 from http://kidshealth.org.

[8] Siegrist, J., Rödel A. (2006). Work Stress and Health Risk Behavior, *Scandinavian Journal of Work, Environment & Health* [2006, 32(6):473-81] (PMID:17173203).

[9] Tan, (2009). Stress, it's everywhere and it can be managed, *American Nurses Association,* Retrieved at http://www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/2009/Stres on October 1, 2010.

[10] Ulveni, A. J., Omdal, K. A., Herlovnielsen, H., & Dahl, E. (2007). Seafarers' Wives And Intermittent Husbands Social And Psychological Impact of a Subgroup of Norwegian Seafarers' Work Schedule on their Families, *International Maritime Health,* 58, 1 – 4.

[11] Wadsworth, E. J. K.; Allen. P. H., McNamara, R. L. & Smith, A. P. (2008). Fatigue and health in a seafaring population. *Occupational Medicine*, published online on 29 February 2008 doi:10.1093/occmed/kqn008.

SORTING OF WASTE IN THE ACCOMMODATION SPACES AND PREVENTING DISCHARGE OF USED DRUMS INTO THE SEA

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Keywords: waste sorting, crew's cabins, colour code, used drums, tracking code.

SORTING OF DOMESTIC WASTE

The seas are polluted due to both inland and maritime activities. More preventive actions should be taken nowadays in order to stop people from blaming the shipping industry for the pollution and to share our responsibility in pollution prevention [1].

Instead of having only one garbage station on deck, waste should **be sorted right from each crew member's cabin and common places**. In each cabin and common place, there should be a set of three or more trash bins. Those bins are supposed to be of different colours for different types of waste. The trash bags inside each bin should be of the same colour as their respective bins.

Figure 1. Discharge of ship-generated waste at the Port of Montreal (July 8, 2017).

The colour code

A recommendation for a mutual colour code for receptacles and their trash bags inside at the deck garbage station should be established, as well as for those trash bins and trash bags used for domestic waste in the accommodation spaces. An example of the possible colour code for the deck garbage station is presented as below:

Table 1. An example of the mutual garbage receptacle colour code for deck garbage station.

Category	*Colour*	*Category*	*Colour*
A. Plastics	Red	F. Operational wastes	Grey
B. Food wastes	Green	G. Cargo residues	Black
C. Domestic wastes	Blue	*E-waste*	*Yellow*

The marks on grocery products

In order to make the process of sorting domestic waste more easily, a recommendation for the simple marks on domestic provisions and supplies' packaging should be established. Those marks shall be directly printed or pasted (as stickers) on the products. There is no need to take a five-second thinking before throwing a piece of trash into a bin. Remembering the colours is easier than remembering the names or categories: red to red, green to green and blue to blue.

MANAGEMENT OF USED DRUMS

The evidence

The below video was captured by a Russian crew member on board of a Russian tanker sailing somewhere in the Sea of Japan. The used drum was thrown into the sea because of irresponsibility of the crew. Remaining oil and paint could cause serious pollution to the seas.

Table 2. The video link.

https://youtu.be/TYr7nRLyvRE	

Figure 2. A used drum thrown into sea.

Database and management

In order to prevent seamen from throwing used drums into sea, loading and discharging of drums and other containers (e.g. paint tins, jerry cans, etc.) should be controlled via barcode, QR code or other tag number. It means, each drum is permanently fitted with a fixed code. With the code and other supporting applications, drums can be tracked when aboard or ashore via a mutual online system. The remaining quantity of drums aboard is known as the number of loaded and discharged drums is recorded. Therefore, the history of each drum can be easily tracked up to its last owner.

CONCLUSIONS

A good solution cannot achieve a positive result in the absence of consciousness and responsibility of crew members and passengers aboard, as well as port authorities and heads of shipping companies [2].

REFERENCES

[1] IMO. International Maritime Organization. The International Convention for the Prevention of Pollution from Ships. MARPOL Consolidated Edition, 2017: pp. 253-265.

[2] Vuong Hai. Uploaded data for the presentation at the IAMUS2018. Vladivostok: 2018. Available from: <https://drive.google.com/drive/folders/1RSV4CRLwvgwHsRMaBQJJWDfCBIOQ57L2?usp=sharing>.

IT and modern technology in maritime studies

Analysis of the possibility of using sorbents to combat oil pollution in port and coastal areas.

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Abstract

Petroleum substances are a mixture of many hydrocarbons of various structures, some of them are toxic for organisms. In case of pollution of the aquatic environment, these compounds may enter sea water organisms and adversely affect gas exchange and inhibit photosynthesis. Therefore it is important to take measures to reduce the emissions of these compounds into the aquatic environment and to quickly remove possible spills in the event of uncontrolled pollution. Sorbents are best suited for the absorption of oil-derived substances. They are used to absorb leaks in open and closed tanks, particularly in hard-to-reach places. The publication deals with the issues related to the analysis of the possibility of using sorbents to combat oil pollution in port and coastal areas. The paper discusses the types of pollution occurring in coastal waters, as well as the types of sorbents used and the forces and measures to combat pollution. Absorption tests were carried out and the best sorbents for combating oil pollution were selected.

Key words: environmental protection, oil-related pollutants, sorbents

AUTONOMOUS SHIPPING AND THE HUMAN ELEMENT

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Keywords: Autonomous shipping, Technology, Maritime, Economics, Industry.

ABSTRACT

In the maritime industry, business owners are constantly searching for new ways to reduce costs, increase efficiency, and limit injuries. First came the onset of the container, which revolutionized the maritime industry by fostering the future development in intermodal transport globally. Next came the increasing vessel sizes and smaller crews, which in theory would limit the number of ships while dramatically increasing the economy of scale. Today, these same companies have begun the lengthy process of research and development for the world's first fully autonomous vessels. Business owners have decided that the next area to eliminate will be the workforce on board the vessel, and for this reason, full autonomy appears to be a worthwhile investment. As the world has seen thus far, autonomous systems within the transportation sector are still far from completion due to the unreliability of programs and equipment. Despite attempts to remove human error from shipping by automating essential functions, future vessels find themselves vulnerable to new types of human errors found in codes associated with docking, open sea transit, and the loading and discharge of cargo.

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AUTONOMOUS VESSELS IN THE MARITIME INDUSTRY

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THESIS:

Keywords: Autonomous Vessels

Although the prospect of autonomous vessels presents interesting opportunities for the advancement of transportation on the waterways, an analysis of case studies, articles, and concerns from experts in the industry indicate that the introduction of autonomous vessels will cause the fundamentals of shipping to evolve past the industry's threshold for adaptability.

ABSTRACT:

The maritime industry is constantly changing in regards to technological advancements. One significant development which has made substantial progress recently, is the idea of fully autonomous vessels. Several case studies and articles have been published which support autonomous shipping, noting the potential benefits such as economic and efficiency benefits. However, many of those who work within the industry and bring up concerns of safety and efficiency for future shipping. These unmanned ships are expected to sail and navigate on waterways where they will encounter unpredictable conditions. On fully staffed ships, human involvement offers a degree of accountability that significantly reduces the risks of these conditions as it allows a constant analysis of the local changing conditions. Mariners also provide a key function for the vessel through their versatility and their ability to perform daily maintenance. Additionally, there are numerous issues with cybersecurity. Vessels must find methods to

counteract the threats brought on by these technological advancements, requiring further research into hardware protection. Although electronic automation is a necessary component to the maritime industry, without the adaptable human involvement which a mariner provides, the safety of life at sea and life ashore could be at risk. Within this paper, an in-depth look regarding autonomous shipping will be taken though the analysis of various studies and the opinions of experts within this field proving that the introduction of autonomous vessels will cause the fundamentals of shipping to evolve past the industry's threshold for adaptability.

REFERENCES:

[1] Hambling, David. "Ships Fooled in GPS Spoofing Attack Suggest Russian Cyberweapon."*New Scientist*, Aug. 2017.

[2] Burmeister, Hans Christoph, Wilko Bruhn, Ørnulf Jan Rødseth, and Thomas Porathe. "Autonomous Unmanned Merchant Vessel and Its Contribution towards the E-Navigation Implementation: The MUNIN Perspective." Science Direct. Elsevier, 19 Jan. 2015. Web. 06 May 2018.

[3] Baraniuk, Chris. "How Hackers Are Targeting the Shipping Industry." BBC News. BBC, 18 Aug. 2017. Web. 15 Apr. 2018.

[4] Vallejo, Daniel. Electric Currents: Programming Legal Status into Autonomous Unmanned Maritime Vehicles, 47 Case W. Res. J. Int'l L. 405 (2015)

[5] Biesecker, Calvin. "Boeing 757 Testing Shows Airplanes Vulnerable to Hacking, DHS Says."*Avionics*, Avionics, 16 Nov. 2017.

[6] Freedberg, Sydney. "Was The Merchant Ship Hacked? McCain Collision Is First Run For Navy Cyber Investigators." *Breaking Defense*.

[7] Perera, L. P., J. P. Carvalho, and C. Guedes Soares. "Autonomous Guidance and Navigation Based on the COLREGs Rules and Regulations of Collision Avoidance." (2009): n. pag. Print.

[8] Matthews, Christian. "Unmanned Ships Are Coming – but They Could Cost the Cargo Industry Dearly." News and Articles on Science and Technology. Phys.org, 04 Sept. 2017. Web. 07 May 2018.

[9] Willumsen, Torgeir, and Simonsen Vogt Wiig. "A Commercial Reality Check for Autonomous Shipping in 2018." *Seatrade Maritime News.*

[10] Almeida, Rob. "Part 2: How to Propel a More Efficient Ship – GCaptain." GCaptain, 11 Jan. 2014.

CAMERA CALIBRATION FOR AUTOMATED BEHAVIOR ANALYSIS OF BRIDGE WATCHKEEPING PERSONNEL

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Keywords: Camera Calibration, Behavior Analysis, Bridge, Watchkeeping

1 INTRODUCTION

With respect to the safety of life and property at sea and preventing pollution of the marine environment, proper watchkeeping during navigation has great importance. Thus, the master of the ship shall ensure that watchkeeping arrangements on the ship are adequate for safe navigation[1]. At this point, the following question arises; how to assess whether there is continuous proper watchkeeping during navigation. Master of ship evaluates his crew performance during navigational watch by random visiting and checking or watching bridge from his cabin if the bridge is equipped with a video camera. But he cannot control all navigational watches during the whole voyage. If there is a computer-based automated system that can analysis behavior of watchkeeping personnel, it should be a novel system to improve navigational safety. Because officer and watchman will keep a proper watch if they know that they are continuously being watched and evaluated. In that point, we reveal steps to establish computer-based behavior analysis system. According to our model, the first step to create this system is establishing 3D environment from multiple video camera views for real-time mapping and monitoring. In this context, the aim of this study is to conduct camera calibration of three bridge views to create common coordinate system between these multiple views. Extracted body pose features from each camera views are combined by backward projection method to create 3D pose of watchkeeping personnel.

2 BACKGROUND

Nowadays, it is possible to train a computer to be competent in any matter that a human can do [2]. However, in order to achieve learning, input and output data labeled by experts are required. In our problem, we should think whether one could evaluate lookout behaviors of the officer on watch (OOW) and the watchman by watching them via video camera monitor. If the answer to this question is yes, the computer system can also achieve this assessment by proper training procedures. What is needed here is to be able to take the right steps and choose the right inputs by correct outputs. According to the model shown in Figure 1, body-pose features and its tracking data (x_{ij}) can be input while behaviors of OOW (y_k) corresponding to those inputs in a specific time interval can be output data. By using those data, we can teach a computer to evaluate the behaviors of OOW by using the machine

learning algorithms. However, there should be multiple camera views in order to supply continuous and clear tracking. When using multiple cameras to analyze the same scene, camera calibration is a necessary step to establish the common coordinate system. Thus, establishing common world coordinate system of multiple camera views by camera calibration algorithms is a pre-requisite of establishing lookout performance system.

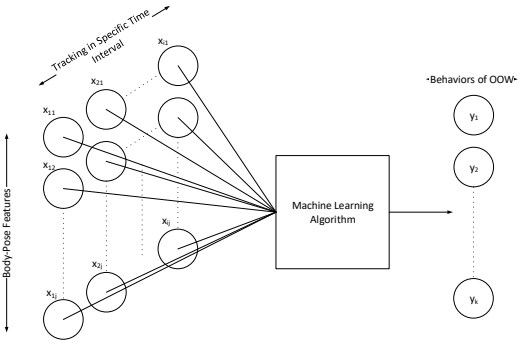

Figure 1: Training model for automated behavior analysis

3 RESULTS

Our data comprises pictures from three cameras on the bridge in different positions with different orientations. We conduct Heikkila's camera calibration method to create common 3D coordinate system of these multiple views [3]. Then, in order to extract body parts from multiple bridge images, we utilize real-time multi-person 2D pose estimation algorithm [4]. Only the joints detected on at least 2 cameras' FOVs are used to calculate their 3D world coordinates. Results show that if the joints are correctly detected by pose estimation algorithm, they can be mapped into 3D coordinate system to create 3D pose of OOW. This platform can enable continuous and clear tracking of watchkeeping personnel. Also, we can teach a computer to evaluate and analyze behaviors of watchkeeping personnel with 3D pose tracking data by using the machine learning algorithms.

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REFERENCES

[1] IMO. *STCW including 2010 Manila Amendments (ID938E)*. 2017 ed. London: International Maritime Organization, 2017. ISBN 9789280116359.
[2] Michalski, R. S.; Carbonell, J. G. and Mitchell, T. M. *Machine learning: An artificial intelligence approach*. Springer Science & Business Media, 2013. ISBN 366212405X.
[3] Heikkila, J. and Silven, O. A four-step camera calibration procedure with implicit image correction. In: *Proceedings of Computer Vision and Pattern Recognition, 1997. Proceedings., 1997 IEEE Computer Society Conference on*: IEEE, 1997, 1106-1112.ISBN 0818678224.
[4] Cao, Z.; Simon, T.; Wei, S.-E. and Sheikh, Y. Realtime multi-person 2d pose estimation using part affinity fields. In: *Proceedings of CVPR*, 2017, 1, 7.

DESIGNING A DYNAMIC POSITIONING SYSTEM BASED ON ROBUST RECURRENT CEREBELLAR MODEL ARTICULATION CONTROLLER

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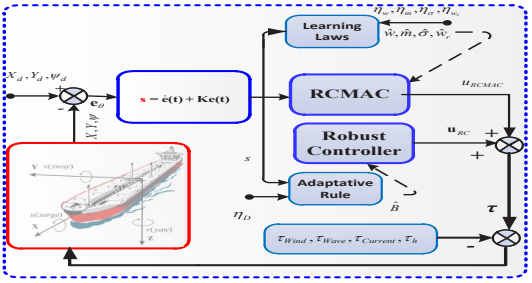
Abtract: The dynamic positioning is a time varying parameters and complex system due to effects of ocean environment. In this research, a Robust Recurrent Cerebellar Model Articulation Controller System (RRCMACS) is used to keep vessel routine following a desired trajectory. Herein, the Recurrent Cerebellar Model Articulation Controller (RCMAC) with its fast learning and good generalization capability is utilized to compensate changes in parameters of the vessel during operation to minimize the error surface and the robust controller attenuates the effects of the sea invironment acting on the hull of the vessel to achieve stability of the system. The simulation results of the dynamic positioning system proved the effectiveness of the proposed controller

Keywords: Dynamic positioning, Cerebellar model articulation controller, Recurrent Network, Robust controller, high nonlinearity systems.

Introduction

The motion of vessel is freely in the 6-Degrees of Freedom (6-DOF) with three translational movements and three rotational movements. Dependence on designing control systems, the 3-DOF reduced order models can be used. In this research, a 3-DOF model with horizontal-plane (surge, sway and yaw) for the vessel motion is investigated, and showed in Figure 1. Due to time varying parameters change and the effects of the ocean environment, Model based controllers can't achieve good performance index.



To deal with these harsh problems, many researchers have used modern controllers, such as fuzzy PID tracking controller, neural network, adaptive fuzzy neural network, neural network based fuzzy sliding mode. The results of above researchers showed the superiority of modern controllers to traditional controllers. However, the effects of ocean environment such as surge, wind and water current were not considered completely. Furthermore, dynamic response, local minima and learning time problems were not taken into account in designing of the controller. Consequently, this paper proposes a RRCMACS for the dynamic positioning system as follows.

The parameters of the vessel and sea environment used for simulation

The parameters of the vessel are 76.2 m, 18 m and 4.6 m regarding to length, beam and draught

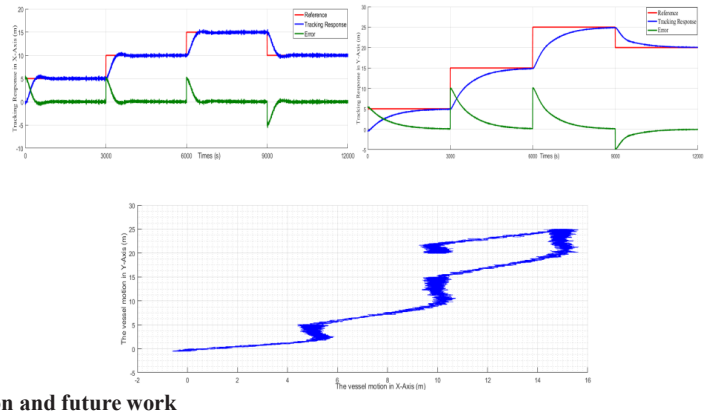
The parameters of wave model: $H_s = 0.8m$, $\omega_p = 0rad/s$, $\psi_0 = -30$, $s = 2$, $N = 20$, $M = 10$, $\varsigma = 3$, $k = 0.005$, $\psi_{\lim} = 0$.

The parameters of wind model: $A_L = 2.4$, $A_T = 2.4$, $V_\omega = 2m/s$, $B_\omega = 20^0$

The parameters of current model: $V_c = 2m/s$, $\psi_L = \psi_H = 0$, $B_c = 30^0$

The parameters of high frequency wave noise model: $\omega_0 = 0.8976rad/s$, $\lambda = 0.1$, $\sigma = \sqrt{2}$

The simulation results using the RRCMACS



Conclusion and future work

In this paper, the dynamic positioning is successfully controlled by the RRCMAC system under varying parameters and effects of sea environment. Simulation results show that the proposed control system has good tracking response in different directions during motion of the vessel with small error. However, the control system should be improved to control the vessel motion in the 6-DOFs coordinate and extend effects of the sea environment acting on the vessel.

REFERENCES

[1] F.J. Lin and S. Y. Lee, "Intelligent integral backstepping sliding-mode control using recurrent neural network for piezo-flexural nano positioning stage", Asian Journal of Control, vol.18, pp. 456–472, (2016).

[2] Q. Dai and N. Liu "Alleviating the problem of local minima in Back propagation through competitive learning", Elsevier Journal, neurocomputing, pp. 152-158, (2012).

[3] J.Yang, S.Li and X.Yu, "Sliding-Mode Control for Systems With Mismatched Uncertainties via a Disturbance Observer", IEEE Transactions On Industrial Electronic, vol.60, pp. 160-169, (2013).

[4] V.P. Ta, X.K. Dang and T.Q. Ngo, "Adaptive Tracking Control Based On CMAC for nonlinear Systems", Proc. of the Inter. Conf. on System Science and Engineering, pp. 494-498, (2017).

[5] T.Q. Ngo, T.V. Phuong, Robust Adaptive Self-Organizing Wavelet Fuzzy CMAC Tracking Control for Deicing Robot Manipulator, International Journal of Computers communications & control, vol.10, pp. 567-578, (2015).

E-PPRVISION OF E-NAVIGATION STRATEGY IMPLEMENTATION

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Keywords: e-navigation, analysis, accident, facilitator

1 INTRODUCTION – THE ANALYTICAL REVIEW OF THE CURRENT PROBLEMS OF SAFETY OF NAVIGATION

The present paper deals with importance of e-navigation concept development and implementation. Thus, the research deals the analysis of current problems in provision of safety in marine industry and the idea, aims and benefits of e-navigation development. Accordingly, the conclusive part of the paper presents the nautical students-oriented website concept, offering e-provision trends of development of e-navigation in the twenty-first century. Results of conducted analysis of the database of "Annual Overviews of Marine Casualties and Incidents of the European Maritime Safety Agency" (EMSA) shows high and stable number of casualties, incidents and accidents. Research also displays sufficiently large number of vessels participated. Thus, 16539 marine casualties and incidents (happened from 2011 to 2016) involved 18655 ships [1]. The analysis of the accidents shows, that in the same time period grouping of contact (18%), collision (16%) and grounding/stranding (15.6%) shows that navigational casualties represent 49,6% of all casualties with ships [1]. Thus, navigational accidents represent the focus of life threatening problems existed in marine industry. At the same time, among occupational accidents, 40% are caused by slipping, stumbling or falling of crew. The research shows that human mistake represents 60% of accidental events, related with shipboard operations as a contributing factor [1]. The next step of the research development offers the results of the analysis of "Consolidated version contact/collision" (the IMO Lessons Learned), which displays the spectrum of human mistakes, resulted in collisions and contact [2]. Accordingly, it may be clearly concluded that human mistake, causing significant number of critically dangerous navigational accidents requires special attention.

2 E-Navigation Concept as Prospective Provision of Safety at Sea

Considering the results of conducted analysis, according to which the leading place in marine accidents is taken by the navigation-related ones and the human mistake element, playing the most important role in such vitally important issue, there is a clear need to take the effective steps towards resolving the problem. Bearing in mind the modern trends of digitalization of all contemporary industries, the whole chain of the elements of marine infrastructure should step towards the digital world reality. Thus, reflecting the fact, that provision of safety and security at sea (as well as protection of the World Ocean) is the principal goal of the industry, the IMO considers, that the concept of e-navigation development should create digital policy for uninterruptedly upgrading safety and security of navigation and enhancement of the World Ocean protection. Therefore, existence of modern digital attitude, monitoring the decision-making process (as the human mistake prevention) should increase safety issues at sea. E-navigation concept should support bridge teams by ergonomic on board systems and really instant communication with vessel traffic services to minimize the risk of the accidents. Thus, there is a vital and persuasive challenge to equip the chain of bridge teams and shore based stations with up-to-date (and uninterruptedly upgrading) tools aimed at provision of prompt assistance to ensure shipping and communications with reliable and watch keeper-friendly tools. [3] Naturally, the process of e-navigation development and implementation is a future-oriented concept, which should firstly assess the current problems and further ensure the bridge and shore based teams' needs for extra solutions of current and prospective issues. Consequently, the analysis of the IMO E-navigation Strategy Implementation Plan (SIP), results in the following list of prospective tasks:

- provision of the OOWs with real time information and assistance in risks assessment;
- delivery of uninterrupted globally covered communications;
- support the immediate assistance for contingency response;
- effective distribution of the informational workload of the users, providing double check of decision-making; [4]

Conclusion – Nautical Students for Facilitation of E-provision of E-Navigation

As the conclusion, for me, as for the future user and current facilitator of E-navigation concept, one of the most important points of the IMO-developed "Plan for enhancing public awareness of e-navigation" is creation of E-navigation student – oriented website, the concept of which I propose on the basis of the IMO "Draft E-Navigation Strategy Implementation Plan" - Annex 3 - "Plan for enhancing public awareness of e-navigation". Backed by results of conducted analysis and prospective trends of the IMO, there is a need for the website, which should include and cover the following patterns:

- web platform for discussions on e-solutions for e-concept of planning/conducting a voyage;
- creation of the concept of precise e-determination of ship's position;
- development of e-principles of a safe navigational watch with an instant globally supported responds to emergencies and a distress signals at sea;
- prospective trends of e-manoeuvring of the vessels;
- Applications, related with current and prospective trends of Maritime Education and Training;
- Unification of teaching resources through creation of unified interactive teaching data;
- Webinars, ensuring communication exchange between the students and stakeholders;
- Link, summarising the main issues of E-Navigation Strategy Implementation Plan, providing news and updates on the e-navigation implementation process;
- Vision, FAQ and Q&A on e-navigation. [4]

REFERENCES

[1] Annual Overview of Marine Casualties and Incidents 2017 , European Maritime Safety Agency, 2018 [online]. [viewed date 22 June, 2018]. Available from: http://www.emsa.europa.eu/news-a-press-centre/external-news/item/3156-annual-overview-of-marine-casualties-and-incidents-2017.html

[2] Lessons learned, Consolidated version Of Grounding, IMO, 2018, [online], [viewed date: 20June,2018].Available from: http://www.imo.org/en/OurWork/MSAS/Casualties/Documents/Consolidated%20version%20of%20Lessons%20Learned/Consolidated%20version%20grounding.pdf

[3] STRATEGY FOR THE DEVELOPMENT AND IMPLEMENTATION OF E-NAVIGATION , IMO, 2018, [online], [viewed date: 25 June,2018]. Available from: http://www.imo.org/en/OurWork/Safety/Navigation/Documents/enavigation/MSC%2085%20-%20annex%2020%20%20Strategy%20for%20the%20development%20and%20implementation%20of%20e-nav.pdf

[4] DRAFT E-NAVIGATION STRATEGY IMPLEMENTATION PLAN, IMO, 2018, [online], [viewed date: 21 June,2018]. Available from: http:// www.imo.org/en/OurWork/Safety/Navigation/Documents/enavigation/SIP.pdf

FUZZY-PSO ADVANTAGE CONTROL TECHNICAL FOR TORPEDO MOTION OPTIMIZATION

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Abtract: The Torpedo is nonlinear object which is very difficult to control. Via to manage the rudder angle yaw, the diving plane angle, and the fin shake reduction, the torpedo yaw horizontal, the depth vertical and roll damping of the system are controlled. In this paper, Particle swam optimization is used to optimize the parameters of fuzzy controller. The coverage domain width of membership function and the overlap degree influence of membership functions are considered in the method to adjust dynamically from system errors. Thereby optimizing the control signal and enhancing the torpedo motion quality. The proposed method results in a better performance compared to other control method such as adaptive fuzzy-neural.

Keywords: Torpedo, adaptive fuzzy-neural, particle swam optimization, nonlinear control

1. Introduction

The torpedo motion is a nonlinear and complicated in practical applications, this characteristic would pose challenges for control in the first decades of the twentieth century. The torpedo actuator system executes control commands to ensure that object sponges the reference trajectory. Faruq A et al. (2011) present the Fuzzy algorithm combined with the output gain optimization algorithm to improve the response quality as well as the weight update time of the controller [1]. Vuilmet C. (2006) introduces a solution that combines a back stepping algorithm with accelerometer feedback technology to control a torpedo, sponge a preset trajectory by the navigation system [2]. This solution shows promising results on realistic simulations, including highly time-varying ocean currents. Thereby, the environmental impact has a significant the effects on the torpedo trajectory. The other study, Vuilmet C. (2005) elaborates a sliding mode control from a simplified linear model of a heavyweight torpedo [3]. Then, author use this control law with the torpedo nonlinear model in order to evaluate the robustness of the control law in relation to the parametric uncertainties of model, and the sea current perturbation due to flow effects as well as tides. Chen Y et al. (2008) apply a back stepping robust L2 gain control strategy. In simulation, the torpedo depth can be controlled well in the conditions of uncertainties and various initial states, and other state variables in torpedo model are stabilized [4].The studies restriction only eliminate uncertainties in input parameters that cause erroneous of control process, without the other influence such as current. The direct adaptive fuzzy-neural output feedback controller (DAFNOC)is proposed by V P Pham et al. (2013), which uses the fuzzy neural network singleton to approximate functions and calculate the control law with on-line turning weighting factors of the controller functions [5].Simulation results show that the system is able to adapt quickly to external disturbance and interference evaluation of control channels.In this paper, the authors have been proposed Fuzzy-PSO advantage control technical for torpedo motion

optimization. P*article swarm optimization* (PSO) is adopted to calibrate the structure of fuzzy controller, thereby enhancing the quality of system and optimizing the controller structure for torpedo motion. On the other hand, the propose method is able to carried out for the other autonomous underwater vehicles (AUVs) or vessel.

2. Fuzzy-PSO controller design for torpedo motion optimization

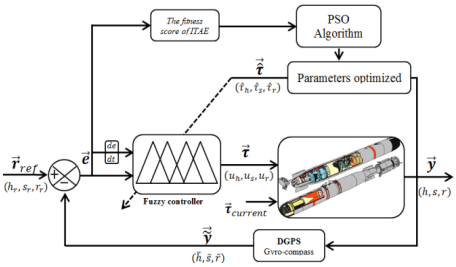

Figure 4. PSO algorithms for torpedo motion optimization (proposed method).

REFERENCES

[1] Faruq A, Abdullah S and Shah M, "Optimization of an Intelligent Controller for an Unmanned Underwater Vehicle", Telkomnika Vol9, No2, p.245-256 (2011)

[2] Vuilmet C, "A MIMO Backstepping Control with Acceleration Feedback for Torpedo", Proc.Int. Conf. onThe 38th Southeastern Symposium on System Theory (Cookeville) vol 38 (USA: Tennessee Technological University), p.157-162 (2006)

[3] Vuilmet C, "High order Sliding Mode Control Applied to a Heavyweight torpedo", Proc. Int. Conf. onThe 2005 IEEE Conference on Control Applications (Toronto), p.61-66 (2005)

[4] Chen Y and Wang D, "Backstepping Variable Structure Control with L2 Gain for Nonlinear Torpedo Depth System", Proc. Int. Conf. On The 3rd International Conference on Innovative Computing Information and Control (Dalian) vol 3 (China: Dalian University), p.291 (2008)

[5] V PPham, X KDang and D TTruong, "Control System Design for Torpedo using a Direct Adaptive Fuzzy-Neural Output-feedback Controller", Proc.Int. Conf. On The 2nd Viet Nam conference on Control and Automation (Da nang), pp.92-98, (2013)

[6] Kennedy J and Eberhart R, "Particle swarm optimization", Proc.Int. Conf. on The 1995 IEEE International Conference on Neural Networks (Western)Vol 4 (Australia:University of Western Australia) pp.1942-1948, (1995)

[7] Yanfei T, Liwen H, and Yong X , "A General Technical Route for Parameter Optimization of Ship Motion Controller Based on Artificial Bee Colony Algorithm", International Journal of Engineering and Technology, pp.9133-9139, (2017)

[8] Xu-zhou L, Fei Y and You-bo W, "PSO Algorithm Based Online Self-Tuning of PID Controller", Proc.Int. Conf. on Computational Intelligence and Security, 2007 International Conference (Harbin) vol 7, pp.128-133, (2007)

[9] Chih-Hua C , "A Numerical Study of the Viscous Effects on the Particle Transportations Due to a Solitary Wave Propagating over a Concavity", International Journal of Engineering and Technology, pp. 1525-1532 (2018)

Logistics and management

AN OPTIMIZATION MODEL SUGGESTION FOR DRY PORTS (OPMOPORT)

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Keywords: Dry port, container, transportation, logistics center, optimization model, sea port.

THE LINK BETWEEN LOGISTICS CENTER AND SEAPORTS

The increase in container traffic within the scope of maritime transportation affects many small volume ports in the sea borders of Kocaeli Province in Turkey which do not have the possibility of expansion except by filling the sea. It is considered that, if the railway connections of these ports are supplied and regular cargo transfers are made between the **K**osekoy **L**ogistics **C**enter (**KLC**), which is approximately 50 km away from the ports, the transaction capacities can be increased and the traffic complexity living in the port city can be minimized.

If this is done, more economical and safe transport will be provided; since the cost of container storage at a dry port is cheaper than at ports, transportation providers (carriers) will gain economic advantage; ports will increase transaction volume and profitability; the dry port will generate new customers and new revenues; ultimately all actors will benefit. With the transition from road transport to rail, CO_2 emissions will be reduced and thus environmental pollution will also be reduced. In this study, the benefits (income increase) that will be gained in terms of sea ports, dry ports and transporters, have been examined by establishing an optimization model. As a result of the study, it was understood that all actors could increase their income with dry port application.

The aim of this study is to set up a mathematical model to help lead the operators and the decision makers. A sea port stationed in the Kocaeli Gulf and a dry port to support this port are examined in this study. However, it is considered that the results obtained in the solution of this model can be an example for the other sea ports and dry ports around the world.

Recent throughput performance of the seaports

The global containerized trade of the world has grown with a CAGR (Compound Annual Growth Rate) of 3.5% over the last ten years. The top 40 container ports handled a total of 415.9 million TEUs in 2016, which accounts nearly 60% of the world total. These 40 terminals in total showed a 1.7% increase relating to the previous year [1]. In general Turkey and specially the Kocaeli Ports showed a much better performance in that period in comparison with world total and top 40s total volumes. Among them YILPORT has exhibited a remarkable performance with an annual increase of 26.3% for the last year.

The majority of ports in Turkey are having difficulty to fulfill the functions other than loading and unloading due to insufficient land [2]. The main reason for such difficulty is derived from lack of space. Another problem is the poor transportation network. 97.6% of the cargo carried between ports and cities is transported by road and 2.4% by rail [3]. Increasing the share of railway transportation of goods to 20% is indicated as Turkey's 2035 targets in its logistics vision [4]. A dry port application may be an effective measure to deal with capacity problems for the container terminals and to reduce the associated congestion and harmful gas emissions, especially in port cities [5]. This is quite new for

Turkey. The Turkish Republic State Railways (TCDD), knowing the importance of port and railway connections related to the dry port concept, is leading the way in this regard. The KLC stationed in Kocaeli is one of the eight logistics centers put into service by TCDD. KLC will be able to support the ports in the Gulf of Kocaeli after enhancing its capability.

Formulating OPMOPORT related to a case study: YILPORT and KLC

A Linear Programming model, named as OPMOPORT (Optimization model for dry ports), has been developed to solve the capacity problems and to maximize the profit at a sea terminal. Within the case study it is assumed that YILPORT's transaction volume increases constantly so that it might experience capacity problems about 2020s, and KLC is a dry port supporting Kocaeli ports through a well-established rail and road network. OPMOPRORT has been run related to the values that can be confronted with about 2020s. Solution of the problem created according to the case study exhibits that a seaport may drive away the threat resulting from capacity constraints by collaborating with a dry port. This application will keep the seaport from losing its customers and allow room to welcome the surplus amount.

Conclusions

Experimental results in relation with OPMOPORT and the case study show that all actors in the scenario may have benefits as explained below through the application of dry port.

- **YILPORT** will be able to **handle 77% more** than its real capacity can embrace. It could head off the risk of losing customers and bring in **32.7% more income**.
- **TCDD** will gain an extra income related to railway transportation equivalent to 62% of the income that YILPORT will earn from the boxes delivered to KLC.
- **KLC** will also get an extra income related to warehousing equivalent to a quarter of the income that YILPORT will earn from the boxes delivered to KLC.
- **Carriers** will be able to **reduce the inland transportation cost almost by half** since the majority of the transportation routes will be replaced by railways for the boxes to be sent to Ankara.
- Since the duration of trucks on the roads is reduced and consequently the **CO_2 emissions will be minimized, environmental benefit** will also be gained.

It is believed that OPMOPORT may be developed to test other scenarios related to similar circumstances anywhere of the world which necessitates the some logistics solutions.

REFERENCES

[1] UNCTAD. Review of Maritime Transport 2017 [online]. Geneva: UNCTAD, 2017. ISBN 978-92-1-112922-9. pp. 64-65. [viewed date: 20 May 2018]. Available from: <http://unctad.org/en/PublicationsLibrary/rmt2017_en.pdf?user=46 >

[2] Esmer, S.; Oral, E. Z. Türkiye'de Konteyner Limanlarının Geleceği. In: Balas, L. *Türkiye'nin Kıyı ve Deniz Alanları VII. Ulusal Kongresi Bildiriler Kitabı, 27-30 May 2008: Deniz Taşımacılığı, Limanlar, Tersaneler.* Ankara: Middle East Technical University, 2008, C I and II. pp. 557. ISBN: 978-9944-5023-9-9.

[3] UDHB (Ministry of Transport, Maritime and Communication). *Limanlar geri saha karayolu ve demiryolu bağlantıları master plan çalışması.* Ankara: UDHB AYGM, 2015. Final report, pp. 7-17.

[4] UDHB (Ministry of Transport, Maritime and Communication). *Ulaşan ve Erişen Türkiye*. [online]. Ankara: UDHB, 2017. pp. 188. [viewed date: 20 May 2018]. Available from: <http://www.udhb.gov.tr/images/hizlierisim/106af411fbac1ce.pdf>

[5] Notteboom, T.; Rodrigue, J, P. Inland Terminals within North American and European Supply Chains. In: UN ESCAP. *The Transport and Communications Bulletin for Asia and the Pacific: Development of dry ports.* Bangkok: UN ESCAP, 2009, No. 78, pp. 1-2. ISSN: 0252-4392.

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BATUMI PORT. MAKING ITS FUNCTIONING BETTER

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Keywords: Batumi port, rip, berth

Batumi port is one of the oldest ports. Its history dates back to ancient times. In 1878 it was declared Porto Franco. The main purpose of building this port was oil. It made the basis for the construction of Batumi-Baku railway. First oil tanker which entered Batumi port was British oil tanker named "Murex". Same ship which was loaded in Batumi port opened the navigation of the oil tankers through the Suez channel on the 23rd of august, 1892. Nowadays port has 11 berths. Each berth has its own function. Throughput of oil terminals is up to 15 million tons annually.

One of the biggest problems of Batumi port is rips. When they occur, ships that are docked in Batumi port are in danger. They might hit berth, as they are moving uncontrollably. So ships need to go to roadstead. It creates discomfort for shipping companies. Our goal is to make facility which will hold the ships during rips, so they don't have to burn additional fuel.

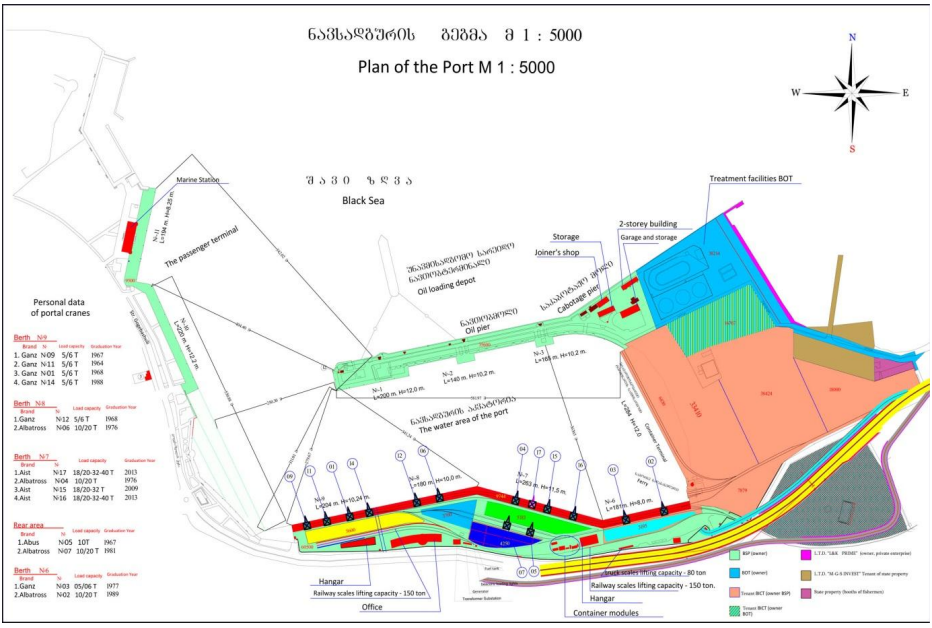

Figure 1. Batumi port scheme

REFERENCES

[1] Batumi port webpage. Batumiport.com

PORT FUNCTION EVOLUTION UNDER INTERMODAL TRANSPORT-CASE STUDY OF NINGBO-ZHOUSHAN

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Abstract: In 2015, China launched the 'Vision and Actions on Jointly Building the Silk Road Economic Belt and 21st-Century Maritime Silk Road' (B & R Initiative) and the 'Intermodal Demonstration Project'. These actions were intended to improve the development of her Western economy through the construction and deployment of inland ports that transfer the remaining capacity for economic development of the East and strengthen land contact with neighboring countries. Sea port, under such circumstances, works as the pioneer of those projects, bearing the mission to provide seamless transportation for the connection of nodes along the 'B & R'. It has been reported, according to UNCTAD, that port's role under modern transport system has been extended and varied gradually with the development of transportation. When it came to the 21st century, regionalization, alliances and intermodalism driven the lateral growth of port companies. Along with the expansion of its hinterland, port started to cooperate or develop with inland areas, serving as part of the whole transportation. This article mainly focus on the evolution of port in its transport system. Port function has witnessed a great development due to intermodalism from basic transport activities to value-added and information services, effectively promoting the seamless transportation. A case study of Ningbo-Zhoushan port, as a reference for other sea ports, was conducted to clarify this phenomenon. Rather than being a transport node or center, Ningbo-Zhoushan extended and broaden its port function to three dimensions in transport services as a resource distribution hub in supply chain: fundamental transportation, logistics value-added and information services, all on a higher level than they used to be. In addition, the comparison with port of Antwerp concluded that more investments need to be put on construction of its inland network and information platform.

Key words: Intermodalism, Port Evolution, Ningbo-Zhoushan

REFERENCES

[1] Martin Stopford. Maritime Economics, 3rd edition[M]. NewYork: Routledge, 2009:5-6.

[2] Verhoeven, P. (2010). A review of port authority functions: towards a renaissance? Maritime Policy & Management, 37(3), 247-270.

[3] Jean-Paul Rodrigue et al. Functions and actors of inland ports: European and North American dynamics. Journal of Transport Geography 2010,18:519–529.

[4] A.K.C. Beresford et al. The UNCTAD and WORKPORT models of port development: evolution or revolution? [J] Maritime Policy & Management.2004,31(2):93-107.

[5] UNESCAP (2002), Commercial development of regional ports as logistics centres. Economic and Social Commissions for Asia and the Pacific. New York: United Nations.

[6] UNESCAP. (2011). Review of Developments in Transport in Asia and the Pacific. Economic and Social Commissions for Asia and the Pacific. New York: United Nations.

[7] Hassan Jafari. Empirical study of the Logistical Role of Sea ports. Applied mathematics in Engineering, Management and Technology. 2013,1(2): 15-22.

[8] Hui Shan LOH et al. Managing Port-Related Supply Chain Disruptions: A Conceptual Paper. 2014, 30:097-116.

[9] Ningbo Daily, accessed 26/02/2017. http://zsxq.zjol.com.cn/system/2016/05/10/021143952.shtml.

[10] Loyd's List, accessed 28/02/2017. One Hundred Container Ports 2016. https://www.lloydslist.com/ll/incoming/article534477.ece

[11] Abood, K. A. (2007). Sustainable and green ports: application of sustainability principles to port development and operation. In Ports 2007: 30 Years of Sharing Ideas: 1977-2007 (pp. 1-10).

[12] Davarzani, H., Fahimnia, B., Bell, M., & Sarkis, J. (2016). Greening ports and maritime logistics: A review. Transportation Research Part D: Transport and Environment, 48, 473-487.

[13] Siror, J. K., Huanye, S., & Dong, W. (2011). RFID based model for an intelligent port. Computers in industry, 62(8), 795-810.

[14] Saeedi, H., Wiegmans, B., Behdani, B., & Zuidwijk, R. (2017). European intermodal freight transport network: Market structure analysis. Journal of Transport Geography, 60, 141-154.

SAFETY OF CRUISE TOURISM AND GEOINFORMATIONAL (GIS) SYSTEMS

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Keywords: GIS, cruise tourism, Georgian tourism, Adjarian cruise tourism development, safety and security.

ABSTRACT

Georgia- located of Caucasus south west side, is a mountainous country, which has a beautiful nature, traditions, old culture and history. Cruise tourists come to Georgia not only from one country, but from different regions of the world.

An important role is given to the analysis of the current situation and the protection of cruise tourism, which provides factor assessments. In addition to assessing factors, there is a factor analysis that also includes a section describing strategies: using the country's strength, to overcome the weaknesses, the use of capabilities and the threats from the region.

For development of cruise tourism, in the port the safe transportation of visitors in various touristic destinations is an important part of excursion service. Researches have shown that it is necessary to have quick access to various parameters of data and their opportunities of processing. Today the unchangeable technology is geographic information systems (GIS) which are the most effective computer and program tools for management of spatial data. A geographic information system (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present spatial or geographic data.

In general, the term describes any information system that integrates, stores, edits, analyses, shares, and displays geographic information. GIS applications are tools that allow users to create interactive queries (user-created searches), analyse spatial information, edit data in maps, and present the results of all these operations. Geographic information science is the science underlying geographic concepts, applications, and systems.

GIS can refer to a number of different technologies, processes, and methods. It is attached to many operations and has many applications related to engineering, planning, management, transport/logistics, insurance, telecommunications, and business. [4] For that reason, GIS and location intelligence applications can be the foundation for many location-enabled services that rely on analysis and visualization.

GIS can relate unrelated information by using location as the key index variable. Locations or extents in the Earth space–time may be recorded as dates/times of occurrence, and x, y, and z coordinates representing, longitude, latitude, and elevation, respectively. All Earth-based spatial–temporal location and extent references should be relatable to one another and ultimately to a "real" physical location or extent. This key characteristic of GIS has begun to open new avenues of scientific inquiry.

Gradually Georgia is becoming a part of global spatial information. Introduction of geographic information systems and their use without Internet access are especially important in Georgia, namely in Adjara for safe travel of foreign tourists which entered a region by cruise liners. In

particular, the introduction of the GIS system will minimize dangerous risks and improve the quality of service of cruise tourists, it will provide them with safety. to create GIS system security. It is necessary to conduct special scientific studies, for tourists which entered a region by cruise liners. Which will be based on joint activities of the state and private sectors.

The geographical data market is growing annually by 10-30%. Therefore, search of objects, positioning and navigation services are quickly developing. Demand for geographical data increases in the real estate market, insurance and tourist branches, sectors of transport, etc. for today's market access to the required space data is often difficult, It is connected with a great deal of time and costs, and therefore they are not effectively used.

The current situation must be changed for cruise tourists, the government must lay down a plan of creation and development of national spatial data infrastructure. it will maximize informational providing for cruise tourists in Georgia, The concrete analysis of the existing geographical data. For this you need to create new and improved services of geographical data, a making a decision using a cruise sector. In general, for the development of better prerequisites for sustainable development of tourism. Parts of this system should be different theoretical geoinformation systems.

At the first stage will be necessary Creation of Batumi Geoinformation System, which will providing cruise tourism spatial data. Such a system will be based on various web applications, Which will be sold as interactive web-maps. Such maps exist, but with limited quantities and information. But we need map for cruise tourists, As much as possible interactive web-site with maximum information. At the same time, informations must update everyday. GIS system gives us those opportunities. such uplications intended for mobiles are the most important ways to move smoothly and safely for cruise tourists. cruise tourists are constantly in danger and under the risks because they constantly have a realtionship with a foreign environment. In order to reduce the risks, it is necessary to be informed about the expected threat. You should know the recommendations of avoiding them, the norms of behavior on the route, etc. This information can be processed properly and can be obtained with GIS systems. it can show you a specific route, tourist destinations, generation of recommendation thematic map with showing a dangerous places.

The article deals with geopolitical, natural-landscape, sanitation, social, medical and other risks.

REFERENCES

[1] Tourism, Security and Safety: From Theory to Practice Yoel Mansfeld, Abraham Pizam , Elsevier Butterworth-Heinemann, 2006

[2] Introduction to Geographic Information Systems , Kang-tsung Chang, McGraw-Hill Education, 2015

[3] Safe destinations , rankings (online) https://safedestinations.com/safest-countries-for-travel/

Maritime education and training (MET)

A NEW APPROACH TO SIMULATOR APPLICATIONS: PRU SIMULATORS

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Keywords: Maritime Simulators, cloud-based simulation, integrated simulator training.

PROPERTIES OF THE SYSTEM

The comprehensive maritime simulator currently active in Pîrî Reis University incorporates various novel technical specifications with its cloud-based, multifunctional and touchscreen operating system which provides remote access to the trainees if required. The integrated training modules include ship to ship and ship to harbor communications and operations, chart and radar handling and utilization, maneuvering and ice navigation. The possible simulation scenarios may be devised for various meteorological conditions in day or night time using 7 basic simulator types. 17 simulation mediums, 50 different type of ships, 3000 various auxiliary vessels and objects, 50 distinct maritime geographic locations can be assigned to serve specific training purposes. The physical training environment is composed of several types of simulators, ranging from the bridge to the engine room, vessel traffic system to fishing, virtual shipyard and harbor simulation to ship modeling, with well-proportioned training classrooms and briefing halls.

Planning and implementation

The phases of project planning and realization of the Pîrî Reis University Simulator Center are listed and detailed, followed by the components and forms of use that make up the Simulator Center stage by stage. The first stage had an importance of the decision to choose the growth and characteristics of the system. The second stage was the infrastructure, design and planning issues. The third stage was the stage in which the selection process for a vendor was carried out. The fourth stage incorporated the discussions involving the most critical choices and precise details. The fifth and the final stage consisted of assembling, commissioning and testing under strict supervision during the procurement process.

Figure 1: The 360º Full Mission Bridge Simulator

Figure 2: Training in PRU simulators

Conclusion

The PRU simulators system, existing facilities, the capability, physical capacity, and cloud-based system first in Turkey, is considered to be one of the most important and extensive simulator centers amongst its counterparts in Europe. With its large capacity and 41 qualified and internationally certified simulator instructors, Pîrî Reis University has the ability to train up to 200 trainees simultaneously.

REFERENCES

[1] Güllapoğlu, A. C. TUDEV's Simulators, Maritime Commerce Magazine, issue January 2009, pp. 14-16.

[2] Güllapoğlu A. C. Virtual Reality (interview), T3 Technology Journal, issue July-August 2013, pp. 67-69.

[3] Güllapoğlu A. C. University Representative at the SiMUC (Simulation User Conference) Meeting on July 13-20, 2013 in the USA.

[4] Güllapoğlu A. C. "Application of Flexible Supplementary Formation - AFSF (A Refinement Approach to Operational Effectiveness of ERS Software in Practical Training of Ship Machinery)", ICERS12 (International Conference on Engine Room Simulators) (19-20 November 2015) Book of Papers.

[5] STCW 2010. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.

AN ASSESSMENT OF OBE IMPLEMENTATION IN THE TEACHING OF MARITIME COURSES

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Keywords: Outcome-based Education, Maritime Academy of Asia and the Pacific (MAAP)

Abstract

Since feedback from the students is a key paramount in determining the different teaching methodologies used by respective maritime instructors, Outcome-based education (OBE), an educational system mandated by the Commission on Higher Education (CHED), was implemented by the Maritime Academy of Asia and the Pacific (MAAP) as their teaching approach. This research aims to determine the impact on the implementation of OBE as other teaching methodologies in teaching Maritime Programs.

The researcher used random sampling in selecting a total of 100 deck and engine cadets, or 53% of the total student population, who have participated in the survey during the second semester of Academic year 2017-2018. Single group design was adopted for the final data processing while One-Sample T test, and mean analysis were used as statistical tool for the parameters of the study.

Overall, both First year BS Marine Engineering and BS Marine Transportation students rated their evaluation on the implementation of Outcome Based Education (OBE) in teaching engineering and deck courses as fairly satisfactory. And among the OBE areas, based on the evaluation of the students, time factor needs to be given attention. Students do not have enough time to accomplish all the requirements for the course. The students have also evaluated resources as the factor that needs to be given attention. They cannot finish and submit all the requirements on the due date because of unavailability of materials in the library and access to internet.

REFERENCES

[1] Barlis J. Jr., Dacwag C., Fajardo, J., III and Aganus E., (2014) "Faculty and Students' Perception towards Outcome Based Education in Teaching Engineering Courses at the Maritime Academy of Asia and the Pacific", Athens: ATINER'S Conference Paper Series, No: EDU2014-1128

[2] Commission on Higher Education Memorandum Order (CMO) 13 series of 2013. "Policies, Standards and Guidelines (PSG) for the Bachelor of Science in Marine Transportation Program". Quezon City, Philippines. May 2013

[3] Commission on Higher Education Memorandum Order (CMO) 37, series of 2012, "Policies, Standards and Guidelines in the Establishment of an Outcomes-Based Education (OBE) System in Higher Education Institutions offering Engineering Programs". Pasig City, Philippines. September, 2012

APPLICATION OF ABILITY PROFILING (APRO) PSYCHOMETRIC ASSESSMENT IN MARITIME EDUCATION AND TRAINING (MET)

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Keywords: APRO, psychometric, approach, competence, assessment

1 INTRODUCTION

The present paper deals with the analysis of advantages Ability Profiling (APRO) Psychometric tests use in Maritime Education and Training (MET). Accordingly, the first part refers to the review of the requirements related with navigational and cargo handling competence of the future marine officers. The second part presents the results of our research of the application of APRO tests in maritime studies. Novelty of the research is interrelated with its theoretical importance – putting the benefits of psychometric approach into MET. The analysis of requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) shows a wide range of proficiency required for certification of the future bridge officers. Consequently, they should be able to perform three major functions: navigation at the operational level, cargo handling and controlling the operation of the vessel and care for persons on board [1]. The stated functions represent nautical knowledge, competence and skills, clearly possible to be assessed through the maritime assessment tools. But not only maritime proficiency provides safe navigation. Research of annual database of European Maritime Safety Agency shows that 60.5% from 1170 fixed accidents were caused by a Human Erroneous Action, when inability of crew to filter information and to make a priority between vitally and secondary importance information causes serious accidents [2].

2 Seagull ARPO Approach – the Way to Provide Safety at Sea

Accordingly, within the entire chain of the steps of planning and implementation of the passage, the officers deal with a huge amount of information related with the state of the ship, her equipment, nautical and weather charts, current, tidal and meteorological information; routeing, reporting systems, pilot messages, rapidly changeable radar and ECDIS data. Reality of shipping requires not only nautical competence, but development of managing and filtering skills of rapidly coming information. Naturally, assessment of the above stated competence needs a modern approach. In our opinion (backed by results of research and personal participation in testing), one of the most effective ways to provide the stated abilities, is to apply Seagull developed Ability Profiling (APRO) psychometric tests. Seagull's Psychometric assessment tool, APRO Program is the sole psychometric assessment tool, created for the maritime industry. The evaluation foresees 7 dissimilar tests selected to evaluate how an applicant perceives, processes and acts on information. In essence it trials speed versus accuracy. The speed/accuracy ratio makes possible to identify the candidate's potentials.

Conclusion - Advantages of putting APRO tests into MET

In our opinion, based on conducted research (kindly provided by Mr. Torger Tau), APRO tests have a double effect: - selection of appropriate candidates for sea service and promotion of modern trends in maritime education and training. Let us bring an example of the assessment of the applicant, clearly showing his abilities to be employed at such important position, as the Officer in Charge of Navigational Watch: "A very strong candidate with excellent abilities: Raven - The candidate scores well above average (7) both for speed and accuracy. Although the candidate has one error in the first subset, which indicates lack of focus, he manages to complete a very good Raven test. He invests time in order to get the correct answer, without investing too much time. The candidate's scores indicate

high general intelligence and very strong abilities within logic thinking. NuFi - The candidate receives a very poor (1) accuracy score and an average (5) speed score. The candidate starts out very well, with perfect accuracy and good speed. It seems that the candidate is disturbed somehow towards the end of the test, as seven of the last eight tasks are answered incorrectly, and on the very last, the candidate has spent an unreasonable amount of time. DOTS - The candidate scores well above average (8) for accuracy and above average (6) for speed, indicating good abilities in this area. The candidate manages to increase his speed towards the end of the test without a great increase in the number of errors, which indicates good learning abilities. Hands - The candidate receives a perfect (9) accuracy score and an average (5) speed score, indicating exceptionally strong global visual perception. BIF - In this test, the candidate scores above average (7) for accuracy and well above average (8) for speed, again indicating strong abilities in the test area. FICL - The candidate scores well above average (8) for accuracy and average (5) for speed. Again, the candidate has invested time in order to get a correct result. This indicates a thorough candidate, and is a very good sign. The candidate again demonstrates strong abilities. FIDR - The candidate scores above average (6) for both speed and accuracy. It is not uncommon to see signs of fatigue in this test, but the candidate shows no such signs." [5] At the same time, as the second advantage of Seagull APRO approach, let's see the results of one and the same applicant, who, at the first time of passing, displayed the following results: "A candidate with accuracy well below average and below average speed. The candidate has a speed-accuracy ratio of 1.2, indicating a strong preference for speed over accuracy. This may indicate that the candidate is interested in completing the test quickly. It is difficult to draw any conclusions from these test results as it seems that the candidate either has no interest in doing well on this test, that the candidate is extremely nervous or that the candidate is suffering from fatigue. If these test results were correct, this candidate could not be recommended for hire onboard a vessel." [6] But being tested the second time (after passing an intensive course of information skimming and scanning) he significantly improved his results: "In general, this is an above average candidate; however, on several of the tests, the candidate shows signs of nervousness or other stress factors which affects the test results. On four of the sub tests, the candidate's accuracy scores are below average. The candidate has no particularly weak or strong abilities – he or she scores within the average on input, processing and output, both for speed and accuracy. The candidate receives an average accuracy score of 5.0 and an average speed score of 5.1. The candidate's accuracy score is in many ways "saved" by his good results on NuFi, Dots and FICL. The candidate has a speed-accuracy ratio of 1.0, indicating an equal prioritization of speed and accuracy." [7] Accordingly, special maritime disciplines should be aimed at development of not only nautical competence, but also at provision of logical thinking, application of previous information in new surroundings, visual attention, self-control and time management, micro and macro visual perception, fast and proper decision making, space coordination and space-perception.

REFERENCES

[1] The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), London, IMO, 2011

[2] Annual Overview of Marine Casualties and Incidents 2017, European Maritime Safety Agency, 2018 [online]. [Viewed date 24 June, 2018]. Available from: http://www.emsa.europa.eu/news-a-press-centre/external-news/item/3156-annual-overview-of-marine-casualties-and-incidents-2017.html

[3] Lessons learned, Consolidated version of Grounding, IMO, 2018, [online],[viewed date: 24June,2018].Availablefrom:http://www.imo.org/en/OurWork/MSAS/Casualties/Documents/Consolidated%20version%20of%20Lessons%20Learned/Consolidated%20version%20grounding.pdf

[4] Seagull Ability Profiling test 1

[5] Seagull Ability Profiling test 2

[6] Seagull Ability Profiling test 3

[7] Seagull Ability Profiling test 4

CONCEPTUAL DESIGN FOR THE CONSTRUCTION OF A TRAINING SHIP

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Keywords: Ship, Training, Shipbuilding

Maritime transport is a main means of freighting goods on a global scale. This is one of the fastest-growing sectors, which needs highly trained personnel. It is for this reason that the training of the future marine specialists is of utmost importance. A main problem with their training is the practical part of education or, more accurately, the practice at sea, which every student must undergo. A large part of the students returning from sailing remark upon not receiving sufficient support and attention from the responsible officers, which itself leads to receiving less real knowledge. On the other hand, the responsible officers are unable to, even if they wish to, devote enough attention to the cadets, due to their professional duties onboard the ship. Another problem pointed out by the trainees is that, depending on the ship they are being trained on, they only receive practical knowledge applicable only for that type of ship. This subsequently creates lots of problems with starting work as a junior officer on another type of ship. The students also remark that it would be exceptionally useful were the the total number of apprenticeships increased during their time studying at the university, and in doing so – have them start from the early stages of their education. Looking through the aforementioned problems with the practical education of the future marine specialists, we, at NVNA, have developed a project for a training ship, which would meet the following criteria:

- To be equipped with the most modern maritime simulators
- To recreate the practical conditions on as wide a variety of ships as possible
- To combine within itself theory and practice
- To be multifunctional so that it may cover as wide a spectre of education as possible
- To be safe and to guarantee the safety of the people onboard during work and training

The practical education will be provided by the separate modules on the ship, which will provide the students with the opportunity to train on the systems and mechanisms of the four main types of ships that there are in global use. These are container ships, roll-on/roll-off ships, tankers

and bulkers. Each module will provide an opportunity for real practical education in loading and unloading operations and the specifics of the type of ship.

The projected sizes of the ship are: 205 m length, 30 m beam, 9-10 m draft, and a total capacity for a complement of 200, including instructors and trainees. The gross tonnage that the ship will be able to carry, according to the separate modules, is: 6000 m^3 liquid loads (2 tanks - 3000 m^3 each), dry bulk with a gross size of 8875 m^3, 140-220 containers (depending on their size) and 200-300 cars. The training ship is also going to be equipped with two lecture halls with a total capacity of 100 people, a star hall for 50, simulators, workshops, a radar centre, and a medical centre as well.

Regarding stability and maneuverability, the ship will be fitted with submerged hydrofoils, a bow thruster and two azipods for better maneuverability, and a hull vane to reduce the ship's drag and its fuel consumption, thus increasing its efficiency.

The training ship will provide an opportunity to increase the total number of apprenticeships during the time of studies, and moreover they will be able to start in the first years of education. It will guarantee a higher quality practical education and make sure that the students receive longer lasting knowledge of the separate systems, mechanisms, equipment and specifics of the different types of ships. Furthermore, the existence of such a ship will provide for a very good combination of theory and practice, an opportunity for training every marine specialty on one ship, and the building of higher-motivated marine personnel.

We reckon that the realization of such a project would considerably increase the quality of education and provide an opportunity for more flexible university politics regarding the seafaring apprenticeships question.

Figure 1. 3D visualization of the training ship

Psychological and Sociological Education effect on Seafarers' condition

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Keywords: seafarers, MET, psychological and sociological education, EMSA, stress, fatigue, philosophical concept, attitudes

Does our Maritime Education and Training(MET) system prepares and develops maritime students enough for very harsh and determined jobs at sea? Throughout 3 years in the MET institution, the author sought a purpose to identify the study of psychological and sociological education for seafarers.

Based on Europe Maritime Safety Agency(EMSA) Annual Overview of Marine Casualties and Incidents 2017, 106 fatalities, 957 injuries and 26 ships lost were reported. One of the causes that contributed to this extremely high number of accident every year is the human error itself. It is generally acknowledged that stress, fatigue and unprepared mental condition could lead to human error which also could causes a serious disaster level of accidents every year. Over the past decades, seafarers been living in a hectic life on board for a long period time as to meet the standard requirement by their company which slowly causing them to have problems whether inside their mind or their physical body. Furthermore, living condition with a cramp and limited space plus no communication from outside of the world can fuel up the mental stress of the seafarers. although it looks like a frivolous study, this research brought to mind and give awareness that psychological and sociological education of seafarers should be focused on.

In order to avoid such psychological problems, this research provide insight to find out does the psychological and sociological education in MET is sustainable or not to build up philosophical concepts and attitudes of a quality student. The research has been aimed toward different kind of groups of students,

1. Freshmen: first year students who lack of knowledge about the seafarers
2. Sophomore: second year students who already have the basic knowledge
3. Junior: third year students who already experience on board training

The research will be carry out on a sample of students attending training courses at Maritime Faculty in Kobe University as the faculty provide a practical and theory on learning about the essential features of the seafarers' life. Generally, the students will be ask 50 to 100 questions about the psychology and stress handling questions involving comparison between normal life and on board life. As a matter of fact, from the result of survey the author will deduct a few suggestions on how to resolve the psychological problems that occur during on board training or working time on sea. Regarding to the solution, it will be based on logical thinking and practical methods which are the procedure on reducing the stress, preparing exercise for mental and

physical body before doing work, and other method that can be technically approved.

In conclusion, it is hoped that MET could provide a sustain psychological and sociological education for students who want to become seafarers in the future so that they are mentally prepared and ready to bound for rough works.

Keywords: seafarers, MET, psychological and sociological education, EMSA, stress, fatigue, philosophical concept, attitudes

References:

1. Seafarers' Social Life and Its Effect on Maritime Safety, 1999 by Ahmed Hafez:https://commons.wmu.se/cgi/viewcontent.cgi?referer=https://www.google.co.jp/&httpsredir=1&article=1045&context=all_dissertations

2. Sociological Aspects of Seafarers? Life and work and Management Styles in Shipping, March 08, 2015 Andrija Nenadic: https://www.omicsonline.org/open-access/sociological-aspects-of-seafarers-life-and-work-and-management-styles-in-shipping-2162-6359-1000237.php?aid=51689

3. The Annual Overview of Marine Casualties and Incidents 2017 by Europe Maritime Safety Agency

SVENDBORG INTERNATIONAL MARITIME ACADEMY OPEN SIMULATOR LEARING/TRANING ENVIRONMENT

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Keywords: Open learning, ship simulator, bridge simulator, engine room simulator, education, training, modern technology.

OPEN SIMULATOR

The purpose of our presentation is to describe the concept and benefits of having an open simulator environment as an extra-curricular learning activity.[1] Open simulator offers students the possibility of training and developing skills and competences[2] besides what is included in the maritime education. Open simulator is an opportunity for the students, to use some of their spare time to get familiarize with the simulator and gain knowledge of a watch keeping officers duties.

Bridge and engine room simulator

At SIMAC we have two full mission combined bridge and engine room simulators, which has been available for student exercise since autumn 2017. Exercises are carried out beside the normal opening hours supported by a training instructor. Exercises are either specific purpose 4 hours bi-weekly or general training purpose (12 or 24 hours) where we mimic normal ship operations. In special purpose training, we have the opportunity to choose our own scenarios. At the general training purpose, the instructor has developed a setup for the combined bridge and engine room simulator.

The purpose of open simulator is for the students to experience some of the scenarios and challenges they will face as a watch keeping officer at sea.

Examples; on the bridge (figure 1) you might face a near collision with another vessel, and in the engine room (figure 2) the students will experience a generator failure and subsequent black out situation.

As students we are facing the challenge of avoiding collision (at the bridge) and solve a generator problem (at the engine room) restoring normal ships operations, by using our experience in the open simulator environment.

Figure 1 Picture from the bridge simulator

Training and Communications

When we as students choose to participate in the open simulator events it is mainly for training purpose. We get familiarized with subjects from the education. This improving our skills and competences through experimental learning.[3]

The most important is gaining personal experience reducing uncertainty, where uncertainty is defined as “lack of information”.[4]

By using the open simulator offer it is possible for the student to create, improve and even train own methods and procedures. This includes both how to avoid and handle critical situations as well as experiencing a normal vessel operation.

At open simulator, we have the possibility of training with students at all levels (all semesters and all educations at SIMAC). Which mean that knowledge and experience is shared among students also improving the social life at the academy. This is also aligned with the SIMAC value of supporting an open learning environment.

Since the appearance of training staff is limited during open simulator events, more experienced senior students act as trainers. E.g. the senior engineer's cadets will share their knowledge and experience from their first assignments at sea and share how to understand and interpret the integrated ship systems by analyzing values and numbers in our integrated control system. Among deck officer students, more experienced students will help the lessor experience students with e.g. watchkeeping (COLREG) and safe navigation. But both parties will incorporate the knowledge the students have gain during the class room education.

This element of "peer learning"[5] improves not only the learning environment of the less experienced student. By converting the learner (the student) into an instructor, where more experienced students will learn from that new role.

Figure 2 Picture from engine room

As senior students are participating in open simulator, can we train our coming ranks as watch going officers at sea, by using assertive communication[6] to be on a level that will respect the younger students. At the same time, we can build up knowledge about how to be a great and motivating leader.[7] The senior students can also learn and improve their communicating skills as a leader, while training the responsibilities and manage of the engine room or bridge at all time.

The main objective of our presentation is to present the principle of having open simulator for all students and ensure all get better trained and prepared officers, when they're starting service at sea. We think this is a great possibility for us to learn more and feel more experienced on the bridge and in the engine room in our future assignments as officers.

It is exciting to share knowledge with other students.

REFERENCES

[1] Wikipedia. (11. March 2018). *Extracurricular activity*. Hentet fra School terminology: https://en.wikipedia.org/wiki/Extracurricular_activity

[2] Tang, J. B. (11. March 2018). *Teaching for Quality Learning at Universit*. Hentet fra The Society for Research into Higher Education: http://hust.edu.oak.arvixe.com/media/197963/-John_Biggs_and_Catherine_Tang-_Teaching_for_Quali-BookFiorg-.pdf

[3] Wikipedia. (11. March 2018). *David A. Kolb*. Hentet fra David A. Kolb: https://en.wikipedia.org/wiki/David_A._Kolb

[4] Galbraith, J. R. (1974). Organzation design: An information processing view. Bruxelles, Belgium: Interfaces. & Lengel, R. L. (1986). Organizational information requirements media richness and structural design. San Antonio, Texas: Management Science.

[5] Wikipedia . (11. March 2018). *Peer learning*. Hentet fra Learning - Peer learning: https://en.wikipedia.org/wiki/Peer_learning

[6] Mind Tools Content Team . (11. March 2018). *How to Be Assertive*. Hentet fra Asking for What You Want Firmly and Fairly: https://www.mindtools.com/pages/article/Assertiveness.htm

[7] Shanahan, D. G. (11. March 2018). *The Human Element* . Hentet fra A guide to hurman behaivour in the shipping industry : http://www.nautinst.org/filemanager/root/site_assets/forums/fatigue_forum/mca_the_human_element_a_guide_to_human_behaviour_in_the_shipping_industry.pdf

THE BENEFITS IN THE DECK CADET TRAINING EVALUATION BY RUBRICS.

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Keywords: Evaluation Methods, Rubrics Scoring, Student Evaluation.

INTRODUCTION

In the studies of Nautical Degree and Maritime Transport that are taught at the Nautical School of Barcelona, students, among other subjects, must complete a 4-month boarding period, as practical, as deck cadet. Once this period of practices is finished, students are evaluated through a written work and a dissertation of it in a public session.

The evaluation system of work and exposure is structured in two parts, which are worth 50% of the note each. These were all the evaluation criteria that we had at the time to evaluate the practices, understanding that it was not enough, since it did not provide tools to the observer to evaluate correctly and at the same time it created incomprehension to the students, when they asked where they had to do, or where they had been wrong or what they should improve. Given this situation, we decided to modify the evaluation criteria and create an evaluation system, consisting of evaluation of 5 items for each part, among which was, the time used, quality of presentation, use of ICT, content detail or communication skills of the student, among others.

Aware that the system had improved but still left unsolved aspects, such as, in the expository part, the gesticulation, the voice or the visual contact, it was decided to improve the evaluation system by completely transforming the method, and implementing a system of independent rubrics for work and exposure, adopting as a model the one suggested in Cadenato A. et al., and created by Rubio J.: Evaluation group of the academic practice, at Polytechnic University of Catalonia, and modified in part to adapt to the singularities of the practices on board a ship, including criteria that were absent and that are considered important.

Modifications in the index of the written memory, and Rubrics.

In addition to the rubrics we also considered to modify the index of the work that contained the subject that, in our opinion, was totally descriptive and did not contribute anything to the knowledge of the student's day-to-day life on board and did not allow to present his own conclusions of the practices. Given this situation, we decided to modify the index to give it a more personal character. Nowadays we include points that consider the tasks that the student is doing day by day, during navigation, safety assessment, etc. On the other hand it is incorporated that the student explains how to adjust specific controls of navigation systems, such as radar or autopilot. We also decided to include a personal assessment and a list of problems raised and their possible resolution. Finally the index was extended to allow inclusion of hand-drawn annexes, inspired by the student book used in Germany, in which the student must draw by hand different areas of interest of the ship, bridge, engine room, etc., noting all the names of the elements found in that area in Spanish / Catalan and in

English. The fact of making these annexes by hand gives the student a better knowledge of the English language and a better internalization of the existing elements on the ship.

Benefits in the evaluation.

Through this system we obtain benefits, (Mertler, 2001, Alsina, 2010, García and Terrón, 2010, Del Pozo, 2012). In the evaluation through the use of rubrics, we manage to guide the students, create a feedback between teacher-student and correct errors so that they can improve in their future development. There are also benefits in the performance of the students, since they make the previously known evaluation criteria their own (Puigdellívol and Cano, 2011, Puigdellívol, García and Benedito, 2012).

On the other hand, there are several authors that provide studies that show that a greater understanding of the evaluation criteria generates a higher academic performance (O'Donovan, Price & Rust, 2001, Rust, Price & O'Donovan, 2003; O'Donovan, Price & Rust, 2001; 2004).

But not only are advantages obtained by students as easing their work preparing the evaluation, but also during the practices improving the value of the items. The teacher also obtains benefits in the evaluation since it has more objective tools for applying the evaluation criteria. By means of some tables, the teacher is punctuating in real time what is happening in the exhibition and what is in the written work if it has been given in advance, and even being able to give the qualification of the exposition once finished or at the end of the subject, informing the student in the same moment of which are his strong points and which should improve for future exhibitions in public and in the professional practice.

REFERENCES

[1] A. Cadenato, A.; Martinez, M.; Amante, B.; Jordana, J.; Sánchez, R.; Farrerons Vidal, Oscar.; Isalgue, A.; Fabregat, J. “Criterios para actividades de evaluación de calidad”. VII CIDUI: The university, an institution of society. CIDUI Congrés Internacional de Docència Universitària i Innovació., July 2012. Available at: <http://www.cidui.org/revistacidui/index.php/cidui/index>. ISBN 978-84-695-4073-2

[2] Mertler, Craig A, Designing scoring rubrics for your classroom. Practical Assessment, Research & Evaluation, Vol. (25), 2001.

[3] Alsina,A. The "pyramid of education math", A tool to help to develop mathematical competence, Aula de Innovación educativa. 189, pp 12-16, 2010.

[4] Cano, E, The rubrics as an assessment tool of competency in higher education: use or abuse? Profesorado, Vol.19, 2, 2015.

[5] O’Donovan B, Price M, & Rust C, Know what I mean? Enhancing student understanding of assessment standards and criteria, Journal Teaching in Higher Education, Vol. 9, 3, 2004.

[6] Rubio, J. Rubric for the evaluation of an oral exhibition, Evaluation group of the academic practice, Polytechnic University of Catalonia: https://www.upc.edu/rima/ca/grups/grapa/recursos/aportaciones-del-grupo/joana-rubio

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THE TWO MODELS OF THE MIDSHIPMAN LEADERSHIP TRAINING AT THE NIKOLA VAPTSAROV NAVAL ACADEMY

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Keywords: Leadership training, maritime profession, midshipman, organization.

HEADING

The profession of seafarer is too different to the romatic stories which are described in the adventure books. Maritime profession is a risky job and its fully of trials.
Not for nothing is said to be a seaman you have to be the men of Steel and for the seamen have only one way-the way of glory. To succeed in this hard area you have to be prepared with knowledge, determination and leadership qualities. Firstly, to survive and secondly, to organise the crew.
The preparation of the future maritime officer requires hard work every day.
During the days of training in the academy the midshipmen begins to build his leadership qualities on the basis of which to become an officer and one day to be the Captain of the merchant vessel or the navy ship. The Captain's word is a law. Leadership is the root cause for organaising the human society. It forms qualities which highlight the leader from the mass of people. On the basis of leadership qualities a man engage and guide the others behind him.

Subheading

Our project is designed as a comparative analysis between two models for leadership training which are developed for education of the midshipman at Nikola Vaptsarov Naval Academy.
The project describes the difference between Transformational Leadership and Transactional Leadership.
It is discribed in details the leadership training of the future maritime officers and the basic concept to build command and management capabilities, accompanied by improvement of personal characteristics and knowledge in the maritime area. How midshipman to become part of the decision-making process, how to express and realize their ideas and how to organise their own command and managment structure to improve their preparation to be good officers and good leaders.

Subheading

The purpose of this project is to present which one organization is better. Does it useful for the midshipman? Does it have any improvements?

We had made a research which was in the last 5 years in the our academy. Now, we are in the our final fifth year and we decide to do this report, because we want to present the skills improvement of the midshipman last 5 years (what are the pros and cons in the structure).

REFERENCES

[1] Avolio, B. J., Luthans, F., & Walumba, F. O.(2004). Authentic leadership: Theory building for veritable sustained performance. Working paper: Gallup Leadership Institute, University of Nebraska- Lincoln.

[2] Bass, B. (1998b). Transformational Leadership. Industrial, Military, and Educational Impact, Lawrence Erlbaum Associates, Inc.

[3] Bass, B. (1985). Leadership and performance beyond expectations. Free Press, New York.
[4] Peev, I. Military Leadership. Psychology recursión. S., MP, 2007.
[5] The perfect teams. The secrets of the business of the Navy seals. S.Lokus.2008.
[6] The new art of the leader. W. Coin.

Maritime English

EVALUATING AND IMPROVING JAPANESE MARITIME STUDENT LISTENING COMPREHENSION SKILLS

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Keywords: listening comprehension, intonation, SMCP, Maritime English, Met, VHF.

What is the best way to study Maritime English for Japanese maritime students? The study of this research aims to emphasize development methods to improve listening comprehension English for maritime students in Japan. Japanese student in maritime schools started to learn Standard Maritime Communication Phrases (SMCP) early on. These days, Japanese vessels are using English as a main language of communication because of an increasing number of foreign crews. Therefore, it is inevitable to use English on the ship. Throughout the three years in Maritime Education and Training (MET) in Japan, the author found two main problems with English listening proficiency. The first one relates to listening and pronunciation problems, for example differentiating words using consonant 'L' and 'R' accurately, due to the absence of the 'L' and 'R' sounds in Japanese language intonations. Most Japanese grow up with limited English exposure in their surrounding life causing them to misunderstand and incorrectly produce English intonations. Through this research, the author would like to find effective ways to improve Japanese Maritime English listening comprehension and differentiate intonations by conducting a few surveys based on two points. For example,

1. Comparative analysis of Japanese yielded descriptions of phonological of 'L' and 'R' words characteristics in listening comprehension of English languages using the Very High Frequency (VHF) radio.

2. Survey for analysis of the listening comprehensive for how many levels Japanese can distinguish English words accurately. The research will be carried out on a sample of students attending training course at Maritime Faculty in Kobe University. In addition, from the results of survey the author would like to clarify a few suggestions on how to improve Japanese English listening skills. For example, the author wants to propose a way of studying listening class using the emergency VHF radio conversation which is with various speeds in the listening lessons so that Japanese students can become more familiar with the normal traffic conversation and intonation.

THE PREMISES OF CREATING THE LEGAL REGULATION OF UNMANNED SHIPS

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Keywords: unmanned ships, law, legal regulation.

Abstract. Technical progress in the maritime transport industry is proceeding at a tremendous speed. The introduction of innovative technologies is necessary both on the basis of economic interests and on the basis of reducing the risks of navigation. The operation of autonomous ships is the source of substantive law and it is necessary to find a formal expression for them.

One of the most relevant novelties is the ships' creation without a crew on board. In this case, control over the movement of the vessel, as well as the possibility to make changes to the mode of operation, takes place through the operator, which will significantly reduce the operating costs, change the nature of the ship's service and the entire global sector of water transportation.

In the legal field, it is necessary to develop clear conceptual categories: **The concept of a ship** and **Changes in the legal framework.**

Vessels on the remote control should work in accordance with existing norms and standards, but their constructive and organizational difference requires changes in a number of existing conventions. In this case, it is necessary to make changes in all the conventions or issue separate annexes, applications to existing conventions that could be applied to unmanned ships. The following work will recommend the direction of creating a legal framework for autonomous navigation.

REFERENCES

[1] International Convention for the Safety of Life at Sea (SOLAS), 1974, http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-for-thesafety-of-life-at-sea-(solas),-1974.aspx (consulted 1 July 2018).

[2] Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs),http://www.imo.org/en/About/conventions/listofconventions/pages/colreg.aspx (consulted 1 July 2018).

[3] International Convention on Salvage, London, 28 April 1989, http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-on-Salvage.aspx (consulted 1 July 2018).

[4] International Convention for the Prevention of Pollution from Ships, MARPOL 73/78, http://www.imo.org/en/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol).aspx (consulted 1 July 2018).

[5] Convention on International Satellite Communications (INMARSAT), 1976, http://www.imo.org/en/about/conventions/listofconventions/pages/convention-on-the-international-maritime-satellite-organization.aspx (consulted 1 July 2018).

[6] Merchant Shipping Code of Ukraine, Kyiv, 23 May 1995 #176/95-BP.

[7] International Safety Management (ISM) Code, 1993, http://www.imo.org/en/ourwork/humanelement/safetymanagement/pages/ismcode.aspx (consulted 1 July 2018).

[8] E. Van Hooydonk, "The law of unmanned merchant shipping", The Journal of International Maritime Law, 2014.

[9] AAWA, Remote and Autonomous Ships: The next steps, London, Rolls-Royce plc, 2016, 44.

[10] Simonsen Vogtwiig "Maritime law in the wake of the unmanned vessel", p.4, 2017.

[11] Unmanned and autonomous vessels – the legal implications from a P&I perspective. Retrieved from: https://www.shipownersclub.com/unmanned-autonomous-vessels-legal-implications-pi-perspective/

[12] Deketelaere P. The legal challenges of unmanned vessels, Universiteit Gent, 2016.

Safety of navigation

ANALYSIS OF ECDIS RELATED MARINE ACCIDENT

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Keywords: Marine Accident, Reliability, Marine Casualties, Human Factor, FTA

Technological developments in the shipping industry provide new resources for navigational equipments and other integrated automation systems. The Electronic Chart Display and Information System (ECDIS) is one of the new technology which provides significant benefits over paper charts in terms of navigational safety which is used in merchant vessels and naval vessels. The amendments of SOLAS regulation V/19, run into force on 1 January 2011 to making ECDIS mandatory and set carriage requirements by IMO [1]. All in all, ECDIS contributes the safe navigation and reduce the workload. In spite of the technological development on navigational equipments, masters and officers' competency and their decision-making ability in any situation is still important issue for navigational safety [2]. ECDIS is only a tool that helps a mariner safely and effectively navigate a ship. On the other hand there is a crucial issue about limitations and risks of the ECDIS. Developments of new skills to use such new technologies are supported by Bridge Resource Management (BRM) which is an important component for the navigational safety. In spite of new technological developments and innovations, maritime incidents still occur due to various factors. In recent years, there has been increasing amount of navigational accidents that caused serious results on marine environment and reputation of companies. The analysis of root causes is crucial to learn a lesson and prevent the reoccurrence of the casualties. The specific objectives of this study were two fold. This paper presents a review of marine accident investigation reports which are ECDIS related. These reports have been selected and investigated from MAIB (The Marine Accident Investigation Board) database for analysis. The first objective was to analyze the main root causes of ECDIS related marine casualties and to improve navigational safety, to improve companies' safety management system by utilizing Fault Tree Analysis (FTA) approach. FTA is a systematic risk analysis approach that cope with the occurrence of an undesired event. At first, all root causes of the events are identified than the probability of undesired incident is determined [3].The second objective was to analyze inspection results for ECDIS related non-conformities in scope of Ship Inspection Reporting System (SIRE) and Chemical Distribution Institute (CDI). The objective of this section is to set out and analyze the inspection remarks associated with the ECDIS (SIRE chapter 4 and CDI chapter 3). Therefore, the database of inspection remarks was provided from tanker management companies in Turkey during the period of between 2013 and 2017. The analysis reveals that 6 main causes of ECDIS related accidents; no use of ECDIS, ineffective use of ECDIS, external factors, not use ECDIS alarms, procedural and human & system interaction. With this findings, 22 sub-causes were determined. The non-conformities related to ECDIS have an important place in navigational inspections, so it is necessary to evaluate these non-conformities and to take corrective actions. Recurrence of inspection remarks were statistically analyzed and non-conformities were examined. The items related

to ECDIS have an important place in navigational non-conformities, so it is necessary to evaluate these non-conformities and corrective actions.

REFERENCES

[1] IMO. *International Maritime Organization* [online]. London: IMO, 2018. [viewed date 15 June 2018]. Available from: <http://www.imo.org>

[2] ASYALI, Ender. The Role of ECDIS in Improving Situation Awareness. The 13th Annual General Assembly of the IAMU, http://iamu-edu. org/wp-content/uploads/2014/07/The-Role-of-ECDIS-in-Improving-Situation-Awareness. pdf, 2012.

[3] GOODMAN, Gerrit VR. An assessment of coal mine escapeway reliability using fault tree analysis. Mining Science and Technology, 1988, 7.2: 205-215.

DESIGNING A SAFETY ASSESSMENT MODEL OF WATERWAY TRANSPORTATION IN GANH RAI BAY – VIET NAM BASED ON FUZZY LOGIC

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Abtract: Safety of navigation in a narrow channel is always a top concern of maritime adminitration. There are many risk assessment models for navigation in a restricted area which were studied and applied wordwide, including IWRAP, PAWSA of the IALA, ES model of Kinzo Inoue. However, these models are not suitable to be applied in Vietnam. In this paper, we analyzed the safety assessment getting from the opinions of captains, pilots and navigators in GanhRai Bay. The results showed that the highest risk is caused by unsafety fishing ships and the most unsafe situation is generated by the directional cutter ship. Further more, the captains and pilots pointed out that the highrisk areas are from buoy N°0 to buoy N°3 and from buoy N°7 to buoy N°9 in Vung Tau – Thi Vai Channel, which was caused by the wind and currents. Based on the statistical and analytical results, we have developed a fuzzy logic program to evaluate the vulnerability of traffic in VungTau –Thi Vai Channel.

Keywords:Safety of navigation, fuzzy logic, risk assessment, Vung Tau – Thi Vai Channel

Figure 1. The traces of moving of underwater vehicles in GanhRai bay in VietNam

REFERENCES

[1] IALA Recommendation 0 – 134 on the IALA Risk Management Tool for Port and Restricted Waterways (Edition 1, May 2006)

[2] Nguyen XuanThanh, Park Youngsoo, Park Jinsoo, Jae Yong Jeong, Developing a Program to Pre-process AIS Data and Applying to Vung Tau Waterway in Vietnam – Based on the IWRAP Mk2 program, Journal of the Korean Society of Marine Environment & Safety, Vol. 19,No. 4, pp. 345-351. (2013)

[3] CIRC.296, the Maritime Safety Committee (IMO),(December 2010)

[4] Kinzo Inoue, Young Soo Park, Hideo Usui, Wataru Sera, Kenji Masuda “ES Model – Safety Management of Vessel Trafic in Ports and Waterways”, Pianc 2002, 30th International Navigation Congress Syney, pp. 805-816, (2002)

[5] Heo Tae Young, Park Young Soo, Kim Jong Sung, “A study onthe Development of Marine Traffic Risk Model for Mariners”, Journal of Korea Society of Transport, Vol.30(5), pp.91-100, (2012)

[6] Statistical report of the accident from 2011 to March 2017 of Vung Tau Maritime Administration, Viet Nam, (2017)

[7] Summary of "Survey on the risks of maritime insecurity of manoeuvring vessels at Vung Tau seaport" by Vung Tau Maritime Administration, Viet Nam, (2017)

IMPROVED SAFETY OF WATER TIGHT DOORS THROUGH HUMAN DETECTION CONTROL CIRCUITRY

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Keywords: safe shipping, anti-crushing protection, water tight doors, life saving appliances, MSC, SSE, human detection

Abstract

Overview
The Maritime Safety Committee (MSC) of the International Maritime Organization (IMO) has formed the Sub-Committee on Ship Systems and Equipment (SSE) to oversee the improvement, implementation, regulation, and discussion of Life Saving Appliances (LSAs) on board vessels. One initiative of this sub-committee is to discuss, implement, and amend regulations, more specifically in regards to proposed improvements and/or designs to water tight door operation for the advancement of an anti-crushing protection (ACP)[1]. Furthermore, the amendments to the Safety of Life at Sea (SOLAS) regulations have been suggested and are currently being reviewed by the International Association of Classification Societies (IACS) to include content in relation to ACP technology[2]. These sub-committees have sighted many accidents which brought into question the safety of the current water tight door operation systems, and more so, seafarer's attitudes, use, and misuse of these current systems.

Examination
This report will examine the human detection method in relation to the conventional and safety strip methods to determine possible improvements to the human detection method. The conventional method is one of single human input with no intelligent detection system to prevent crushing accidents or fault open/closed situations. The safety strip method is the first and most predominant ACP technology currently on the market, using sensors and system inputs to evaluate system faults; however, its use of proximity switches and/or laser photocells as a method of detection to prevent crushing cannot differentiate between obstructions. The human detection method will add another layer of smart technology to the control of water tights doors, whilst keeping operation and equipment simplified to reduce human errors and keep retrofit costs to a minimum. This will be done through minimal changes to the current hydraulic control system in the event of a retrofit situation. A central programmable logic controller (PLC), in conjunction with sensors capable of human detection, and those capable of detecting door position. This circuitry will only affect the closing of the water tight door in the presence of personnel in use of

the door. This method will be contrasted to the two other aforementioned methods for ease of implementation, ease of use, overall cost, and effectiveness.

References

[1] International Maritime Organization. (2017). *Revised Guidance for Water Tight Doors on Passenger Ships Which May Be Opened During Navigation*

Retrieved from
https://file.motcmpb.gov.tw/files/201711/72835ac1-6c0f-47bf-affc-e71c48908d53.pdf

[2] Nafsgreen Press Staff. (2018, February 21). IACS participates at SEE 5. *Nafsgreen Wordl Shipping News.*

Retrieved from
https://www.nafsgreen.gr/sea-scope/regulations/4778-iacs-participates-at-sse-5.html

Use of robots in cleaning underwater part of hull.

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Abstract

More and more restrict rules for reducing marine pollution forces companies to search for new technologies that are cheaper, simplier and more effective in reduction of those.

Main source of pollution made by vessels comes from fuel usage. One of factors that dictates how much fuel needs to be used by a vessel is smoothness of underwater part of vessel.

The publication shows how the smoothness of underwater part of vessel influences its fuel usage and how it is to be dealt with in the future. Technology described in the publication has an opportunity to not only reduce pollution but also massively reduce costs of exploitation vessels as well as reduce their time spend on dry-docks.

Key words: marine pollution, fuel usage, robots

Literature

[1] Aersten G., *Service Performance and Trials at Sea*, Report of Performance Committee 12th I TTC, Rome 1969.

[2] Jurdziński M., *Metody zmniejszenia zużycia paliwa w procesie eksploatacji statku*, Zeszyty Naukowe Akademii Morskiej w Gdyni, Gdynia 2010.

[3] Curran A., O'Connor B., Lowe C., King E., *Analyzing the Current Market of Hull Cleaning Robots*, Worcester Polytechnic Institute, Washington 2016.

Culture and communication in maritime industry

APPLICATION OF SPEECH RECOGNITION ALGORITHM TO INTERNATIONAL VHF COMMUNICATION

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Keywords: Autonomous ship, VHF communication, Speech recognition.

INTRODUCTION

Background

It is believed that autonomous ships will appear in the near future. For example, Rolls Royce and several companies started the project developing autonomous ships[1]. Japanese government also started a national project developing autonomous ships, and major shipping companies and manufacturers of navigational instruments joined this project[2]. However, it is expected that the manned ships and the unmanned ships would be mixed in the sea for long time or forever. Therefore, the manned and unmanned ships must have means to communicate with each other. In May, 2018, Google announced that they are developing an AI (Artificial Intelligence) to reserve restaurants on the phone[3]. It is expected that the technology can also be used for autonomous ship to ship communication on international VHF radio.

Objective

In view of such background, firstly, the author verified the accuracy of the voice recognition technology such as Google's one in converting conversation on international VHF radio,

VERIFICATION

Verification Setting

For the verification, the author used sound data of International VHF which had been recorded on May 19th, 2018, from 14:46 p.m. to 16:22 p.m. at Umihotaru Island in Tokyo Bay (Figure 1).

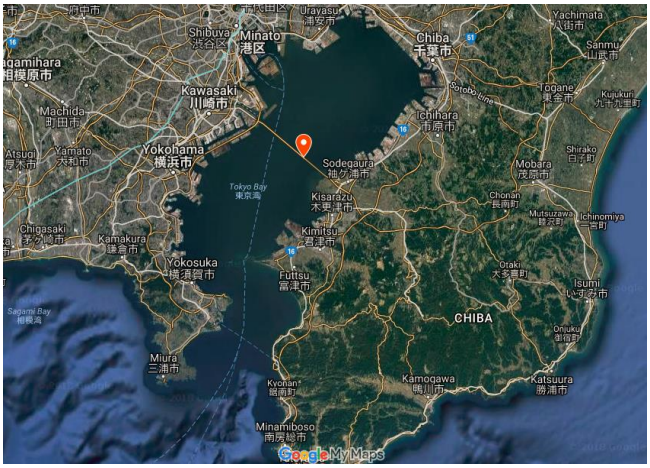

Figure 1. Position of Umihotaru Island.

The VHF transceiver used was HX851JL receiver (Table 1).

Table 1. Specifications of HX851JL[4].

Frequency range	156.025 MHz ～162.000 MHz
Frequency step	25 kHz
Frequency stability	±10 ppm (in operating temperature range)
Signal Form	F3E
Receiving system	Double conversion and superheterodyne
Intermediate frequency	First intermediate frequency: 47.25 MHz, Second intermediate frequency: 450 kHz
Receiver sensitivity	0.25 μV (12 dB SINAD)
Selectivity	12kHz / 25 kHz (-6 dB / -60 dB)
Adjacent channel selectivity	Approximately 70 dB
Intermodulation distortion	Approximately 70 dB
Signal-noise ratio	Approximately 40 dB

The communication on 156.800MHz (Channel 16) is recorded using IC recorder connected with receiver as WAV file format. Then author split the data file into files so that a file contains single sentence, and selected files spoken in Japanese and English for verification. The selected sentence files are converted to text files using voice recognition tool implemented in Google Docs. Then the text files are compared with ground truth text files which the author made.

Result of verification and consideration

The selected sound data contains 245 sentences. The verification result showed that no sentence is converted into fully correct text. There are only 60 sentences whose converted text contains at least one correct word. Thus, 75.5 percent of sentences were not recognized accurately at all. This low recognition rate seemed to be mainly occurred by two reasons. Firstly, the speech recognition tool lacks technical vocabulary used in the conversation on international VHF. The author guesses that the tool is trained by data biased to usual conversation. Secondly, the VHF sound data contains noises. It was observed that some large noises were recognized as voice, and then true voice was ignored.

FUTURE POLICY

The result showed that at least the speech recognition tool in Google Docs is not in the quality for the use of autonomous ship to ship communication. To improve the results, there are four points to be investigated further. Firstly, the other voice recognition tools developed by Microsoft, IBM and etc are to be verified. Secondly, the observation that the low recognition rate is due to the lack of technical terms should also be verified. If so, thirdly, the voice recognition tools should be trained with technical terms. Fourthly, the effect of the noise and the noise reduction signal processing algorithm should be identified.

REFERENCES

[1] “Rolls-Royce to Lead Autonomous Ship Research Project”, Press release of Rolls Royce, https://www.rolls-royce.com/media/our-stories/press-releases/2015/pr-02-07-15-rolls-royce-to-lead-autonomous-ship-research-project.aspx, (2015)

[2] “Japan to launch self-navigating cargo ships 'by 2025'”, BBC News, http://www.bbc.com/news/technology-40219682, (2017)

[3] Sundar Pichai, “ Google Keynote”, Google IO’18 (2018).

[4] “HX851JL Series”, Product Manual, (https://www.yaesu.com/jp/standard_horizon/hx851jl_spe.html (20xx)

BASIC RESEARCH OF VARIOUS MATERIALS MODIFIED BY FRICTION REFORMING FOR ADAPTING TO MARINE ENVIRONMENT

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Keywords: tribology, friction reforming, friction materials, wear resistance properties, corrosion resistance properties, marine environment

Summary: In recent years, utilization of marine resources has attracted attention, increasing the need for friction-resistant metals that are durable in seawater, because the equipment used for exploitation of marine resources has many parts sliding in seawater. Therefore, the metals used in seawater are required to have both high wear resistance and friction resistance. However, only a few metals have both properties. Examples of metals exhibiting excellent corrosion resistance in a marine environment include stainless steel, aluminum alloys, and titanium alloys. However, their tribological properties are not sufficient. Furthermore, in order to use materials such as carbon steel and chromium molybdenum steel in seawater, improvement of their corrosion resistance is indispensable. Based on these circumstances, we are conducting basic research aimed at developing high-strength friction-resistant materials that combine excellent corrosion resistance and tribological properties in marine environments. This paper explains the friction reforming and surface treatment methods that the authors have developed in the laboratory so far, describes evaluation methods and results for various friction property modifications, and finally touches on future efforts.

1 FRICTION REFORMING AND SURFACE TREATMENT

1.1 Friction reforming

The reformer is a combination of a lathe and a milling machine. Friction reforming is a technique for improving tribological properties by adhering hard fine powders to a metal surface by friction. The technique of friction reforming is illustrated in Fig. 1. In Fig. 1(a), the

metal powder is guided to the material surface rotating at a speed N_R through a groove in the tool. Next, as shown in Fig. 1(b), a tool rotating at a speed N_{ZN} is pressed against the material with a load W and moved parallel to it at a speed V_T. Finally, as shown in Fig. 1(c), another tool with a conical tip is used for final-processing in the same manner to produce a smooth surface.

1.2 Zinc pin treatment

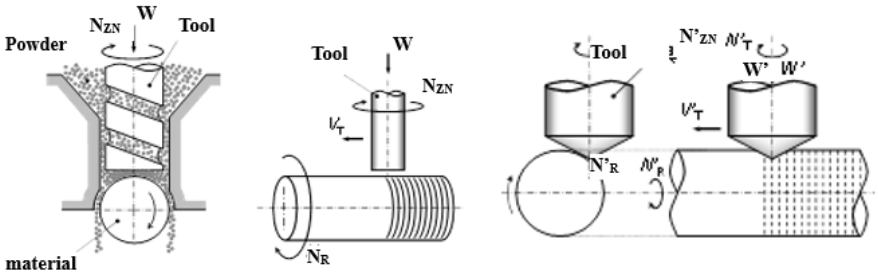
To improve the corrosion resistance of the test piece after friction reforming, its surface was coated with Zn using a Zn pin in a process similar to that shown in Fig. 1(b). This creates a sacrificial layer of Zn on the test piece.

2 TEST PIECES

Table 1 describes some of the modified materials that have previously been created and tested in the authors' laboratory. Here, HSS is an abbreviation for high-speed steel, which improves the fluidity of hard powder during its application to the test piece surface. The appearance of the base material and modified test pieces is shown in Fig. 2.

Table 1. Previously modified materials

Base material	18Cr-8Ni Stainless steel	Carbon steel (0.45%C)	Ti alloy (Ti-6Al-4V)
Hard fine particle	$Si+Al_2O_3$ $Si+SiC+Al_2O_3$ $TiN+SiC+Al_2O_3$	Si+HSS Si+HSS+Zn	TiN+HSS Cr_2N+HSS Cr_2N+HSS+Zn Al_2O_3
Bulk ratio	$Si+Al_2O_3$=50:50 $Si+SiC+Al_2O_3$=43:7:50 $TiN+SiC+Al_2O_3$=38:12:50	Si+HSS=1:9	TiN+HSS=1:9 Cr_2N+HSS=1:9



(a) powder intrusion mechanism (b) friction stir (c) post-processing

Figure 1. Method of friction reforming

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