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EDITORIAL OFFICE

Transactions on Maritime Science Faculty of Maritime Studies Zrinsko-Frankopanska 38 21000 Split, Croatia www.toms.com.hr office@toms.com.hr

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Editorial

lvica Kuzmanić



Dear Readers,

After an excellent reception of the first issue, you have before you the second issue of the internationally reviewed scientific journal "Transactions on Maritime Science" published by the Faculty of Maritime Studies in Split. The journal is published in an electronic, open access and printed form. Our desire is for our readers to have an easy and cheap access.

This issue can proudly boast an invited contribution "Comparative Analysis of Methods and Tests for Testing Colour Vision of Professional Seafarers", along the tracks of the proposals to be discussed at the next annual session of the International Maritime Organization.

Apart from the classic nautical papers, this issue also contains papers from the domain of marine engineering, maritime law, economics and the education of seafarers. Out of nine published papers, four have been written by authors who are not the residents of the Republic of Croatia, which is especially thrilling because our first issue was obviously well-received by the wider scientific community. The number of scientific bases cross-referencing us has also increased. This issue likewise attempted to offer our readers a paper aiming to improve the knowledge of the finesses of the English language, which is essential for anyone in seafaring. Although focused upon a fairly specialized linguistic field, which might be perceived as a departure from the overall concept and themes covered by ToMS, the paper will undoubtedly prove both interesting and useful to a wider readership, thereby contributing towards a better understanding and usage of the English language.

In the framework of yet another field we wish to promote, the field of preservation of our cultural heritage, we also bring a wonderful poem written in the dialect of the inhabitants of the town of Komiža on the island of Vis. Naturally in bilingual form: the dialect of the author, Mr. Ante Božanić and the inspired English translation of Mirna Čudić. In the electronic issue of the journal you can also listen to the author recite his verses.

I would like to draw your attention to contributions "News from IMO" and "Maritime Heritage" dealing with training ships.

We heartily hope that the papers published will prompt you to cooperation.

Comparative Analysis of Methods and Tests for Testing Colour Vision of Professional Seafarers

Veljko Rogošić, Lovro Bojić, Nikola Kolja Poljak^a, Darko Duplančić^b, Pero Vidan^c, Blanka Ivančić-Kačer^c, Rosanda Mulić^c

There are differences among official standards of testing colour vision among different countries, conditioned by out-ofdate, but still enforceable laws and codes. These standards refer to professions in the maritime, air, rail and road traffic. The criteria for testing colour vision are significantly more severe for professionals involved in traffic. For complex diagnostics of colour vision disorder (dyschromatopsia) there are a number of well-known diagnostic methods and tests (of different cost, validity and year of production) at disposal. The difference of diagnostic methods and tests improves the detection of dyschromatopsia. The requirement is the correct choice of tests, correct mode and correct interpretation of results gained for each individual dyschromatopsia, i.e. profession.

KEY WORDS

- ~ Colour vision
- \sim Seafarers
- ~ Standards
- ~ Protocols

University of Split, University Hospital Centre Split, Department of Ophthalmology, Split, Croatia

e-mail: veljko.rogosic@st.t-com.hr

a. University of Split, University Hospital Centre Split, Department of Ear-Nose-Throat, Split, Croatia

b. University of Split, University Hospital Centre Split, Department of Internal Medicine, Split, Croatia

c. University of Split, Faculty of Maritime Studies, Split, Croatia

1. INTRODUCTION

The perception of colour allows the individual to use chromatic impressions in emotional, artistic and professional areas. The present conditions of life involve all our senses, especially visual, in which colour vision is central.

Recently, research of colour vision has aroused interest with many authors to undertake more intensive investigation of *dyschromatopsia* (colour vision disorder) (Čupak, 1994; Staničić, 1991). The prevalence of congenital dyschromatopsia differs among nations, races, and ethnic groups and genders. The reasons for this are seen in the geographical, climatic diversity, and because of migration and mixing of different nations and races throughout history, especially now in the 21st century, but also biological inheritance factors (Flecher and Voke, 1985).

Some authors around the world due to different diagnostic methods and tests got different results. Therefore, it is necessary to note that partly due to the above mentioned reason differences were found in the presence of congenital dyschromatopsia even among members of the same nations, races, cultures and ethnic groups (Cvetnić, 1999; Cvetnić, 1990, Rogošić et al., 2003) (Table 1).

With different nations and races outside Europe the occurrence of dyschromatopsia varies from e.g. Jews up to 4.0 %, African Americans 3.7 %, to Eskimoes 1.0 % (Peić, 1976; Peić, 1977).

Congenital colour vision disorders are more common in men.

Normal colour vision is called *normal trichromacy*, and colour vision disorders dyschromatopsia or *daltonism*, and they are divided into:

- dichromacy partial colour blindness (anopia blindness for a particular colour; protanopia – blindness for red colour, deuteranopia – blindness for green colour and tritanopia – blindness for blue colour),
- anomalous trichromasia colour amblyopia (reduced perception of one of the basic spectrum colours; protanomalia – reduced sense of red colour, and deuteranomalia – reduced sense of green colour and tritanomalia – reduced sense of blue colour),
- transition forms (*extreme anomalies*) and anomalies for pigment colours (incorrect on pseudoisochromatic tables, whereas on anomaloscope they have a normal anomaly quotient (AQ) ranging from 0.65 to 1.3) and
- monochromia or achromatopsia (blindness for all colours).

As dichromats are aware of their deficiency since their youth, they do not show interest for professions for which normal colour vision is necessary (rail, air, maritime or road traffic, as well

Table 1. The frequency of dyschromatopsia according to countries in Europe.

Source: Defective colour vision. R. Fletcher, J. Voke.

State	Dyschromatopsia (%)		
Greece	7.9		
Belgium	7.1		
Great Britain	7.2		
Norway	8.0		
Croatia	8.5		

as certain branches of industry).

Anomalous trichromats (colour amblyopia) are detected by accident, during medical check-ups, in professional orientation, selection and examination in occupational medicine practitioner's dispensary for professions which require normal colour vision. They represent a group that has to be diagnostically processed in detail.

Normal colour vision is necessary in different professions, and Verriest describes the division into three categories of professions which depend on colour vision (Verriest and Uvijls, 1977; Sloan, 1961):

- 1. Professions requiring completely normal colour vision: professional traffic.
- 2. Professions requiring normal colour vision, but in which instruments or suggestions of colleagues assist in colour vision problems.
- 3. Professions in which normal colour vision is desirable, but is not required.

Daily investigations of colour vision are not in the best way defined by mode or recognisability of colour vision disorder. Therefore, in occupational medicine dispensaries it is necessary to set up cooperation with an ophthalmologist, who will determine the type and degree of dyschromatopsia using appropriate diagnostics. Thus, 8.0 % of dyschromatic population is given possibility to be timely advised as for the selection of an appropriate profession. An erroneous interpretation of the data gained based on a single simple test, e.g. pseudoisochromatic tables can have adverse consequences during professional orientation.⁽¹⁾ Since normal colour vision is necessary for many professions, common criteria are also necessary especially in the assessment of extreme cases and pigment anomalies, with the application of diagnostic methods and tests providing the most accurate results for each colour vision anomaly (Sloan, 1961).

At present, for diagnostics of colour vision disorders there are various diagnostic methods and tests at disposal. Differences among diagnostic methods and tests improve detection of colour vision disorders, by correct selection of tests, mode and correct interpretation of data gained for each individual disorder. With such an attitude and activity we achieve new answers to existing disagreements and controversies within the profession. It is nowadays generally accepted that qualitative and quantitative research of colour vision can be carried out with the same accuracy and same iterativeness, such as e.g. the one in vision field testing. Clinical practice lags behind in the realization of adoption of new diagnostics and a simpler standard-protocol, thus contributing to insufficient understanding of colour vision testing. The diagnostic contribution to research of colour vision disorder is relatively weakly represented in literature, and its importance is insufficiently realized. For this reason there is a small number of ophthalmologists who daily deal with this area of work (Sloan, 1961).

The official standards for colour vision testing in traffic have not followed the development of traffic, especially in the case of maritime traffic. At the 43rd Meeting of *Sub-Committee on Standards of Training and Watch-keeping*, 30 April – 4 May 2012 in London, England IMO (*International Maritime Organization*) posed the problem of out datedness of methods and tests for testing colour vision in seafarers. The existing methods and tests that are mandatory for testing colour vision of seafarers are out-of-date and expensive. Since the Sub-Committee has not managed to propose new methods and tests for colour vision testing, they reached the decision to postpone the discussion for the 44th meeting of STW Sub-Committee, and to collect new proposals by IMO member-countries (London, England 13-17 May 2013).

¹ This specially refers to to extreme anomalies (border groups of colour vision disorders) and pigment anomalies (persons who cannot read pseudoisochromatic tables), and for whom effective diagnostics means being able or unable for the profession wanted.

2. DIAGNOSTIC METHODS FOR COLOUR VISION DEFICIENCY

Four basic methods for diagnosing colour vision disorders, their types, sub-types and degrees of defect, i.e. for determination of anomaly quotient (AQ) are widely known:

- Method of denomination or naming colours;
- Method of comparison of colours;
- Method of discrimination or separation of colours;
- Method of equalisation of colours.

2.1. The method of denomination or naming the colours provided

The method of denomination or naming is used with the aid of special lamps with filters of certain colours, while the testee names the colour provided. It is possible to create conditions existing in real life in traffic, such as conditions of reduced visibility. Special lamps, the so called lanterns (*Martin lantern*), that are used for colour vision testing in the army, police, navy, rail, air, road traffic, and that serve for colour vision testing in hard working conditions (Martin et al., 1976). Their great disadvantage is that they cannot actually diagnose colour disorder, or its degree, but they triage candidates who do well with coloured signal devices. Except in photopic conditions (well-lit conditions), it is possible to carry out research in scotopic conditions (in the darkness) (Martin et al., 1976).

Numerous authors such as Pierce, Sloan and Altman, Wright, Bidovec, Pickford and Lakowski emphasize the need for other appropriate methods and tests that would allow correct selection of professionals of different profiles with satisfactory colour vision for certain branches of industry, especially traffic, as well as army and police (Sloan and Habel, 1955; Wright, 1946; Pickford and Lakowski, 1960).

2.2. The method of comparison of the colours provided

The method of comparison of the colours provided uses *Holmgren's* balls of wool or pieces of different colour paper according to *Seebeck* that are mostly out of use nowadays. The doctor sorts out a sample ball of a certain (basic) colour, and the testee from the remaining pile of the balls of wool sorts out the remaining balls of the same or similar colour.

Research can also be carried out using differently coloured circular discs or pawns that are of different colour saturation, and the aim is for the testee to put all pawns in such an order that each following pawn is by colour the most similar to the preceding pawn. Here belong the small *Farnsworth panel D-15 test* and large *100 Hue-Farnsworth-Munsell test*. On that basis modifications to *40 Hue Lanthony test* and *Farbtest 28 Hue red test* were made. In special diagrams or schemes the order in which the testee put the

pawns is recorded and on the basis of this record the conclusion is reached as for the existence of colour vision disorder and its type, red, green or blue (colour disorder axis) (Sloan and Habel, 1955; Wright, 1946; Pickford and Lakowski, 1960).

The performance of *Farnsworth panel D-15* test has to be carried out in daylight. Pawns must not be touched with fingers, or exposed to the light for an extended period of time, so they are kept in a box. The period of test performance is not preset, but it is recorded and becomes an element of assessment of ease with which testing is performed. The order of testing starts from the reference fixed pawn, and the testee gradually classifies the remaining pawns according to the similarity in colour of each pawn with the previously classified one.

2.3. The method of discrimination or separation of the colours provided

The method of discrimination or separation uses *pseudoisochromatic plates (PIC)* (Figure 1). The most widely used are pseudoisochromatic plates of *lshihara* and *Stilling*, but also the plates of other authors such as: *Polak, Rapkin, Bostrem, Bostrem-Kugelberg, Valhagen, Hardy-Rand-Rittler (HRRAO), Toko Medical College (TMC)*, etc. On these plates, i.e. boards there are dots (numbers, letters and figures) of different sizes and colours that are put in such an order that a person with colour vision disorder does not recognize them. These plates are extremely suitable for triage and fast screening of a larger number of testees. They fall into the group of pigment tests.

The term pseudoisochromatic plates originates from the fact that these dots are different in colour, but equal in saturation (quality of a colour related to its purity, when a colour is not mixed with other colours), so that a person with colour vision disorder sees different colours as one and the same colour (pseudoisochromia), i.e. he/she gets a false impression that it is the question of one and the same colour and thus cannot distinguish the number, letter or figure provided from the background and name them (Sloan and Habel, 1955; Wright, 1946; Pickford and Lakowski, 1960).

2.4. The method of equalisation of the colours provided

The method of equalisation of colours with *Nagel* anomaloscope of the old type *I* or newer type *II* is the spectrum test, i.e. the test with coloured lights.

Beside Nagel anomaloscope type II that is mostly in use nowadays and is considered the most reliable device for testing colour vision, especially in the case of congenital dyschromatopsia of the red-green axis, newer generation anomaloscopes are also used such as Oculus Heidelberger anomaloscope (HMC), Tomey all color anomaloscope that can also diagnose the blue-yellow colour vision disorder. Similar older devices (colorimetres) that



Figure 1. Example from pseudoisochromatic Ishihara tables. Source: K. Čupak. Oftalmologija.

are not in use any more due to weaker verification of certain colour vision disorders are: *Gilles-Archer test, Edrigme-Grenova* and *Beyne lantern* (Sloan and Habel, 1955; Wright, 1946; Pickford and Lakowski, 1960), Figure 2.

3. DIAGNOSTIC TESTS FOR COLOUR VISION DEFICIENCY

Tests for detection and classification of dyschromatopsia, i.e. colour disorder are numerous and classified into two major groups:

- tests with pigment colours, the so called *pigment tests* (pseudoisochromatic tables and tests with coloured pawns, or the so called panel tests);
- tests with coloured lights, the so called spectrum tests (anomaloscopes and partially lanterns) (Sloan and Habel, 1955; Wright, 1946; Pickford and Lakowski, 1960).

According to their differential-diagnostic abilities spectrum tests are divided into three basic groups, and they are:

- dychotomic diagnostic tests;
- qualitative diagnostic tests;
- quantitative diagnostic tests.

3.1. Dichotomic diagnostic tests

Testing which can effectively and with the use of fast





Figure 2. Comparison of recent Oculus anomaloscope of Heidelberg multi-colour type (HMC) and anomaloscope Nagel type II. Source: http://www.colblindor. com/2010/02/23/color-blindness-tests/

screening method isolate, i.e. triage normal trichromats (persons with normal colour vision) from dyschromatoptics (daltonists) is carried out by dichotomic tests for testing sense of colour, i.e. colour vision, and these are:

- Holmgren Wool test;
- Pseudoisochromatic tables according to Stilling;
- New London Navy Lantern test (NTL).

Holmgren Wool test includes 125 differently coloured balls of wool and 3 balls of coloured standards. The testee should assess similarity of different balls according to preset standards, sorting them out into three groups according to the nuance of the basic colour.

Pseudoisochromatic plates of Stilling have as background differently coloured dots of the doubled number type. Persons with colour vision disorder read one, and persons with normal colour vision the other. In research lighting and the angle at which one looks at the tables play important parts. If the testee does not distinguish more than 4 plates, he/she is classified into the group with colour vision disorder for red-green spectrum. Modifications of these plates also have the ability of detecting blue-yellow disorder.

On a similar principle pseudoisochromatic plates of Ishihara, Rapkin, Boston-Kugelberg, Dvorin, The American Optical Company Pseudoisochromatic test, HRRAO test, as well as plates of Volhagen, TMC, Matsubara plates and many others have been devised.

New London Navy Lantern test (NTL) has been improved by Farnsworth. It is used in the navy for military and civil purposes in testing extremely red-green disorder of colour vision. The testee is shown pairs of coloured lights that he/she has to name in hard working conditions, i.e. conditions of reduced visibility (simulation of twilight, dark, rain, fog and alike).

3.2. Qualitative diagnostic tests

Some pseudoisochromatic plates beside dichotomic plates

also have plates for qualitative testing, i.e. diagnosing red-green colour disorders, and some plates can test blue-green colour vision disorders as well. Into this group fall:

- Ishihara pseudoisochromatic tables;
- Rodenstock orthorater R 7 with test plate No. R 173

Of all tests the *lshihara tables* are nowadays the most widely used. They contain the starting plate that is followed by four series of plates of larger or smaller number of tables with which systematization has to be perfectly known (Pickford, 1946) (Table 2).

Some editions of these PIC plates are found in a reduced form of 24 or increased to 38 plates, while the main characteristics of plates in the series have been retained. There are also plates adjusted for children and analphabets by the same or different authors.

Nowadays fast screening and triage of candidates is often carried out using *Rodenstock orthorater R 7 with the test plate No. R 173* especially in occupational medicine dispensaries (e.g. seafarers' medical check-up). Orthorater allows differentiating colour vision disorders quickly and reliably, while its disadvantage is that it cannot be used to test tritanomaly or tritanopia. The same orthorater can also be used, beside testing colour vision to which in this case daily or artificial light, or visual acuity have no effect,

to test binocular vision, as well as stereo vision etc. During testing the testee can use one or both of his/her eyes. The test plate has contrary, the so called bipartite fields of identical combination of glass filters for colours, and in the testee's conscience they create a fusionally unique picture. The plate has 6 combination possibilities that while turning are shown to the testees. In 5 positions the fields are of different colours, while in one position the fields are of the same colour (it serves to detect stimulants). The testee does not have to name the colour, but only give an answer such as "similar" or "different.

3.3. Quantitative diagnostic tests

Of all colour vision tests after *Ishihara plates* the most significant are quantitative diagnostic tests such as:

- Nagel II anomaloscope ;
- 100 Hue-Farnsworth-Munsell test, i.e. its reduced modifications (Martin et al., 1976; Sloan and Habel,1955; Wright, 1946; Pickford and Lakowski, 1960; Pickford, 1949).

There are 2 types of *Nagel anomaloscope*:

- type I for testing red and green colour sense (out of use) and;
- type II with wider possibilities of more accurate diagnosing.

Series	Plate	Readability
0.	1	All: normal trichromats and dichromats.
1.	2 to 9	Normal trichromats and dichromats (protans and deutans respond in the same manner). G Verriest warns of plates 4 and 5 where even normal trichromats can make mistakes.
2.	10 to 17	Read only by persons with normal colour vision, because coloured confetti-dots together with the background are made in such a way as to cause confusion with red and green dichromats.
3.	18 to 21	This series contains plates in which persons with colour vision disorder distinguish numbe while normal trichromats cannot see them.
4.	22 to 25	This series allows more accurate distinguishing of different dyschromatopsias, i.e. whether colour vision defect is in red or green colour. Each plate contains two digits of different colour (red and purple) on grey background. A protan (red colour daltonist) confuses the redness of the first digit with the greyness of the background. He reads the second digit only. A deutan (green colour daltonist) acts inversely and reads the first digit only as he cannot distinguish the purple colour of the second digit confetti.

Table 2. Division of colour vision disorders according to pseudoisochromatic Ishihara tables.

Anomaloscopes belong to the group of quantitative diagnostic tests. They are expensive diagnostic devices handled by specialists-ophthalmologists. They represent a basic diagnostic means for reaching a final expertise, i.e. opinion on colour vision deficiency, especially those related to professional traffic, and in accordance with the valid codes. It is used in all major medical centres.

Another type of tests, the so-called panels are easier for the patients, especially smaller variants (modifications) such as 40 *Hue Lanthony* and *Panel D-15 test*. These tests can fairly successfully be done by medium and higher medical staff, wherein the specialist-ophthalmologist assesses the graphic results, just like in vision field reading. It is highly suitable for everyday work in ophthalmological dispensaries.

100 Hue-Farnsworth-Munsell test has 85 coloured pawns. Some of its modifications, among which the best known is 40 Hue Lanthony test panel, is the most accurate in determining chromatic ability in detecting dyschromatopsia. In order to avoid the difficulty of doing the test and the required longer time for the testees taking 100 Hue-Farnsworth-Munsell, it is possible to replace it by an easier modification such as 40 Hue Lanthony test or Panel D-15 test (Sloan and Habel, 1955; Wright, 1946; Pickford and Lakowski, 1960; Pickford, 1949).

D15 test panel includes testing using differently coloured circular discs or pawns of different saturation and the aim of the testee is to put the coloured discs in such an order as to follow by each disc the previous one that is most similar to it in colour.

4. PROPOSAL OF NEW STANDARD FOR TESTING COLOUR VISION OF SEAFARERS

The colour accessories, i.e. tools for colour testing, with the selection of diagnostic methods and tests, have to cover all types of dyschromatopsia (colour vision deficiency), and they also have to precisely determine each type of colour vision defect, i.e. they have to provide a qualitative and quantitative response (AQ).

According to our experience and opinion professional seafarers should be subjected to a medical check-up in ophthalmological dispensaries, that are equipped with all kinds of tests for complete diagnosing or testing of colour vision deficiencies or when such a defect is suspected. The most appropriate combinations of accessories or the standard for colour vision testing of congenital and acquired dyschromatopsias with their advantages and disadvantages are represented by SWOT analysis (*Strengths, Weaknesses, Opportunities, Threats*) in Table 3.

With colour vision testing investigation has to be carried out in a preset period of time and working conditions, and in accordance with the instructions laid down for doing each individual clinical test separately. With the acquired colour vision disorders as a difference from the congenital ones colour retesting is very often carried out (the same instrument and the same tester). The importance of being familiar with the advantages and disadvantages of each particular test, as well as an appropriate selection of a particular test is crucial for the correct diagnosis of colour vision disorder. Professionals working in the field of traffic in special working conditions can additionally be tested using *New London Navy Lantern test (NTL)*, in which the testee is shown pairs of coloured lights that he/she should name in hard working conditions, i.e. conditions of restricted visibility (simulation of twilight, dark, rain, fog etc.). So, the method of denomination or naming is used with the aid of special lamps with filters (lanterns) of certain colours, and the testee determines, names the colour provided. NTL is mostly used in the navy for testing extreme redgreen colour vision defects (Tredici et al., 1999; Cole et al., 2007; Cole, 2007).

From the above mentioned clinical experiences, studies and papers there should appear new, modified, common and simplified, but at the same time reliable laws, or codes applicable to all countries, and related to colour vision testing in professional traffic, especially in the merchant navy, actually under the leadership of: *IMO* and *Commission Internationale de l'Eclairage* (CEI) (International Maritime Organization, 2012).

5. DISCUSSION AND CONCLUSION

The technical and technological development of traffic and traffic lanes has enabled economic progress. In maritime affairs there has been a significant increase in ships' speeds and their sizes that represents an additional hardship for already burdened seafarers. Although the development of electronic navigation devices has enabled watch-keeping and navigation in conditions of restricted visibility (night, fog, etc,), observation of the area surrounding the ship and visual assessment of the situation has so far remained an important factor of safe navigation. Optical omission often leads to unwanted situations. Therefore, it is of particular importance to test seafarers' vision both for colours, and vision acuity, and possibly to diagnose diseases due to the influence of UV radiation e.g. of the Sun (cataract, etc.). For professional seafarers the testing of colour vision is significant. This problem has also been recognised by IMO at the 43rd Meeting of STW Sub-Committee. IMO has not reached any conclusion on the methods and standards of colour vision testing, but has invited the member countries to propose new standards because the existing ones are considered outdated and economically demanding.

In Croatia, according to the relevant Code for the determination of health conditions of crew-members on board sea vessels and inland vessels (NN 111/02), (Official Gazette of the Republic of Croatia), an anticipated medical check-up, among other things, obligatorily includes visual ability testing (function of long-distance visual acuity using optotype, short-distance visual acuity using Jäger optotype, as well as long distance and short

Table 3. SWOT analysis of the methodology of testing colour vision of seaf	arers.
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	Strenghts	Weaknesses	Opportunities	Threats
Rodenstock orthorater R 7 test with board No . R	Screening, triage of a large number of testees and detection	lt cannot test blue deficiency.	A fast and reliable test.	Careful about simulants.
173	of simulants.			
Pseudoisochromatic Ishihara and Stilling plates for adults, children and analphabets	Isolates reliably and quickly persons with normal colour vision from persons suspected of having colour vision disorder.	The testes can learn the order of the plates by heart. Not suitable for testing blue deficiency.	Modification of Stilling plates can also provide response for blue-yellow deficiency. It provides response on persons with pigment colour anomalies.	Stilling plates - 19. They have a very ba print. The edition ha been withdrawn.
Nagel II or Oculus Heidelberg multicolor anomaloscope (HMC)	Nagel II is the most reliable instrument for testing colour vision disorders especially congenital anomalies, providing AQ, i.e. response on the degree of red-	Persons with pigment anomalies do the test with NAD AQ results.	More recent HMC instrument can also provide colour vision result for blue-yellow deficiency.	The shutter must be closed to the maximum, and the eye of the testee must be previously adapted to light.
	green colour vision deficiency.			
40 Hue Lanthony or Panel D-15 test	Simplified modifications of 100 Hue-Farnsworth- Munsell test provide an equally appropriate and fast response on the existence and type of colour vision disorder.	Not absolutely suitable for congenital colour vision disorders.	They are an excellent complement to the results obtained using anomaloscope.	This test is therefore the most suitable for detecting acquired dyschromatopsias i the course of life, or service.

distance vision using appropriate instruments for multifunctional testing of vision sense, colour sense using pseudoisochromatic plates and appropriate instruments for multifunctional testing of vision, binocular vision, phoria, fusion, depth perception and vision field by instruments for multifunctional testing of vision sense, and mesopic vision, or fast adjustment to darkness by appropriate instruments).

A previous medical check-up is done, in accordance with the so far valid regulations, before issuing seaman's or boater's book, before the first employment and before enrolling in educational institutions of all levels of education for seafaring and boating professions. The crew-members of the deck department and candidates for entering nautical departments of educational institutions at all levels of education for seafaring and boating professions have to be able to properly distinguish colours. The crew-members of the deck department and candidates for entering nautical departments of educational institutions at all levels of education for seafaring and boating professions have to have regular stereoscopic vision and vision field as well as the adjustment to darkness within normal limits.

For crew-members in other vessel's departments there are no special requirements as far as visual abilities are considered, provided that with or without correction their abilities are sufficient for successful performance of their tasks, with the obligation of wearing glasses or contact lenses and being in possession of a spare pair of glasses or contact lenses if the correction is necessary (Pravilnik o utvrđivanju uvjeta zdravstvene sposobnosti članova posade pomorskih brodova i brodova unutarnje plovidbe, 2002).

The prerequisite of creating clinically suitable methods of testing colour vision especially in the rail traffic emerged following the rail accident at Lagerlund as far back as 1875. Three years after this rail accident in 1878 Holmgren introduces his already traditional wool balls offering thus the first test for detecting congenital colour vision disorders, and afterwards a whole range of new methods and tests by different authors appeared (Huddart, 1968; Cumberland et al., 2005).

Beside congenital colour vision disorders, of increasing significance are also the acquired disorders, frequent in cases of professional diseases of eye lens, retina or visual pathway. All of this requires common criteria for assessment of individual cases and application of such diagnostic methods and tests providing the most accurate and complete results.

The category to be paid special attention in the diagnostics of colour vision disorders are the transition forms of dyschromatopsia, between persons with normal colour vision on the one hand and persons with colour vision disorders on the other, such as: extreme deuteranomaly, extreme protanomaly, and pigment colours anomaly. Detection of these disorders requires application of additional diagnostic procedures that are not routinely applied, especially not in occupational medicine dispensaries.

It should be mentioned that testing with the use of special lamps, the so-called lanterns, with different filters of certain colours serves only for the testee to name the colour provided in special simulated conditions in traffic, such as e.g. conditions of restricted visibility. It is their great disadvantage that they cannot actually diagnose colour vision disorder, but they triage candidates who do well or badly with coloured signal devices.

Consequently, we are of the opinion that the need should be emphasised for acceptance of other, suitable and simpler methods and tests that would allow the appropriate selection of professionals, especially those in the professional traffic.

The standard for testing colour vision disorders, i.e. vision is proposed:

- 1. Testing colour vision on Rodenstock orthorater R 7 with the test plate No. R 173 for a fast triage of the testees and isolating stimulants.
- 2. Testing with PIC tables of *Ishihara* consisting of 24 plates to detect persons with pigment colour anomalies.
- 3. Testing with Panel D-15 test to determine the type (axis) of colour vision disorder, if it exists.
- 4. Final, but also obligatory testing of colour vision on anomaloscope Nagel II for correct determination of AQ.

Accordingly, it is our opinion that new laws, or codes regulating testing of colour vision of professional traffic participants, especially seafarers should be adjusted and internationally coordinated.

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Automatic Identification System in Maritime Traffic and Error Analysis

Rino Bošnjak, Ljupko Šimunović^a, Zvonko Kavran^a

Automatic Identification System (AIS) is used for security of ships and ports, their identification and protection of marine environment.

Correct installation of AIS device and integration with navigation equipment is of great importance for the correct functioning of the system. To increase system accuracy correct input of data to the system is significant. Correct data interpretation depends on seafarer's ability to recognize errors. In order for the seafarer to get acquainted with the system as well as its advantages and disadvantages high-quality seafarers' training in the use of AIS is of utmost importance. AIS is not a navigation aid, nevertheless it can be used as a device to facilitate navigation.

In this paper the authors are analysing AIS errors and proposing measures for improvement of its functioning.

KEY WORDS

- $\sim AIS$
- \sim Errors
- ~ Security
- ~ Protection

University of Split, Faculty of Maritime Studies, Zrinsko-Frankopanska 38, 21000 Split, Croatia

e-mail: rbosnjak@pfst.hr

- a. University of Zagreb, Faculty of Traffic Sciences, Vukelićeva 4, 10000 Zagreb
- e-mail: ljupko.simunovic@fpz.hr, zvonko.kavran@fpz.hr

1. INTRODUCTION

Automatic Identification System (AIS) contributes to the security of ships and ports, their identification and protection of marine environment. The system recognizes ships and coastal stations and provides data on their characteristics. On board ships it is integrated with other navigation aids:

- Global Positioning System-GPS;
- Electronic Chart Display Information System-ECDIS;
- Voyage Data Recorder-VDR;
- RAdio Detection And Ranging-RADAR;
- ARPA (Automatic Radar Plotting Aid).

According to 2000 Safety of Life at Sea-SOLAS Convention, Chapter V, Rule 19 mandatory navigation equipment dependant on the type of vessel is defined. International Maritime Organization- IMO has adopted new requirements which lay down AIS system as mandatory. IMO regulation refers to all vessels of 300 GT or more in international traffic, cargo vessels of 500 GT or more not operating on international voyages and to all passenger vessels regardless of their size. This decision has been implemented since December 31, 2004 and refers to:

- Passenger vessels built (completed) not later than July 1, 2003;
- Tankers which had their first security check or survey after July 1, 2003;
- All ships, except passenger ships and tankers, of more than 500 GT (eng. *Gross Tonnage* - unit denoting the overall volume of ship's internal spaces) built not later than July 1, 2004.



2. AIS DATA ANALYSIS

For successful functioning AIS requires successive updating and repeated transmission of messages in short time intervals. Usefulness of AIS data is reduced within time function (t):

$f(K) \rightarrow \max \Leftrightarrow t \rightarrow \min$

(1)

- K data usefulness,
- t time lapse.

In order to allow time-synchronised updating, a common self-organisational communication scheme of time distribution has been introduced.

3. AIS USAGE WITH REGARD TO TYPE OF INFORMATION

Use of two types of AIS devices, type A and type B has been laid down as mandatory (Figure 1).

Type A is mandatory for vessels of 300 GT or more operating on international voyages, cargo vessels of 500 GT or more not operating



Figure 1. Automatic identification system data. Source: http://www6.kaiho.mlit.go.jp/kanmon/eng/mg_2.htm

on international voyages and for passenger vessels (carrying more than 12 passengers) regardless of their size. It is estimated that about 40,000 vessels (AIS, 2012) nowadays use type A.

	Antenna position
Static Data	MMSI number (Maritime Mobile Satellite Identity-MMSI)
	Ship's call sign and name
	IMO number
	Ship's length and beam
	Ship's type
Dynamic Data	Ship's position with indication of accuracy (automatic updating using DGPS (eng. <i>Differential Global Positioning System</i>) sensor connected to AIS)
	Time in UT (eng. Universal Time - Central European Time)
	Speed over ground
	Course over ground
	Navigational status (self-propelled, anchored, unable to manoeuvre, of restricted ability to manoeuvre moored, restricted by draught, aground, engaged in fishing or sailing boat)
	Angular velocity
Voyage	Ship's draught
	Dangerous cargo
Related Data	Port of destination and ETA
	Passage plan
VTS data	Short content information related to various safety warnings and information on areas with warnings about navigational and other dangers. The data should be addressed to AIS receiver for all ships and coastal stations within range



Figure 2. Distribution of Automatic identification system.

Type B allows for a new generation of AIS devices which are available at lower prices, of limited range and characteristics. The difference between AIS devices of classes A and B is shown in Table 2. In case the output data from the elements of sets $O_1 - P_1$ and $O_2 - P_2$ are observed via time function the following is valid:

f(t1) - 2-10 seconds (time interval for element o_1 , for device class A),

 $f(t_2) = 6$ minutes (time interval for element o_2 for device class A),

 $f(t_{3})$ - 30 seconds (time interval for element o_{3} for device class B).

The following algorithm is proposed to represent time functions for each element of the above mentioned sets (Figure 3).

4. AIS ERROR ANALYSIS

The system and errors to which AIS is subjected can be represented by the following model:

For the model shown in Figure 4 designation (T) for technical errors and designation (H) for human errors are proposed.

In the operation of AIS system errors caused by human factor occur. Various methods of investigating AIS device errors in which human factor was principal have been conducted (Mohktari, 2007). The errors can be classified as:

MMSI,

Table 2. Output data of Automatic identification system devices class A and B. Source: http://www.navcen.uscg. gov/?pageName=types AIS.

DEVICE CLASS A			DEVICE CLASS B				
Transmission	Proposal for designation <i>O</i> 1	Reception	Proposal for designation P_1	Transmission	Proposal for designation O_2	Reception	Proposal for designation P_2
General data	ao,	General data	ap_1	General data	ao,	General data	ap_1
Static data	ao2	Static data	ap ₂	Does not transmit IMO number and call sign	bo ₂	Static data	bp2
Dynamic data	ao ₃	Dynamic data	ap ₃	Does not transmit dynamic data (ETA - Estimated Time of Arrival, destination, navigational status)	bo ₃	Dynamic data	bp ₃
Text messages	ao ₄	Text messages	ap4	Does not transmit text messages	bo ₄	Text messages	$bp_{_4}$
Binary messages	ao _s	Binary messages	ap ₅	Does not transmit binary messages	bo _s	Binary messages	bp_{5}
Ship's rate of turn	ao ₆	Ship's rate of turn	ap ₆	Does not transmit ship's rate of turn	bo ₆	Ship's rate of turn	bp ₆
Ship's draught	a0 ₇	Ship's draught	ap,	Does not transmit ship's draught	bo ₇	Ship's draught	bp,







- Ship's type,
- Name and call sign,
- Ship's navigational status,
- Ship's length and breadth,
- Ship's draught,
- Destination and time of arrival to destination,
- Other problems related to AIS device.

More different vessels transmit the same MMSI number (eng. *Maritime Mobile Service Identity* - identification number of a maritime mobile station). During research it has become apparent that the same MMSI number 1193046 is transmitted by more than one different vessels. It is possible that this number was adapted to a specific model of AIS device and the reason is wrongly adapted equipment at the time or specific errors of equipment. It was recorded that 26 vessels were transmitting the above mentioned MMSI number and wrong ship's information). The responsibility of the navigating officer of watch on the bridge is to check the data of the above mentioned number in the AIS



Figure 4. General model of Automatic identification system errors.

device before each voyage.

Ships with common features are identified in AIS receiver as same. Such an error occurs due to an insufficient number of categories within AIS device to cover all types of ships sailing the seas worldwide. For example, the more common types of ships such as container ships, bulk carriers or car carriers are shown on AIS receiver as cargo ships. The same is valid for tankers as there is no further classification into subtypes (e.g. product tankers, liquefied gas carriers or chemical carriers) but they are generalized as tankers.

The investigations show that there were no errors with ship's name or ship's call sign on AIS device. Instead of the name or call sign there is a blank space. Without the name or call sign there were altogether 0.5% of AIS messages recorded during investigation. Another problem is the use of abbreviated ship's name due to a lack of or an insufficient number of characters available on the device itself. The errors mentioned above occur due to installation or design which does not allow for the ship's name to contain more than 20 characters (Khisty and Lall, 2003).

In the investigations related to AIS receiver 30% of ships were represented with wrong navigational status. 4% of ships were represented with the status of a sailing vessel instead of the status of a power-driven vessel. Furthermore, it was shown that a ship was proceeding at the speed of 10 knots while on AIS device the ship was represented with the status 'berthed" (the cause of the last example often leads to overload of the master or officer during setting sail when the device has to be updated).

On AIS receiver 47% of ships show wrong length (d) (Graph 1) whereas 8% show wrong breadth (b) within AIS information (Graph 2) (Ewing, 2010).

Incorrect draught information occurs in 17% of input data to AIS. It was also observed that in 14% of cases AIS input for draught is higher than the ship's length. In the remaining 69.5% of cases it was difficult to determine if the data were correct (Vidan et al., 2010).

Destination and arrival to destination – errors to destination and *Estimated Time of Arrival – ETA* make 49% of errors. The most common errors that occur are:

- Number instead of port of destination,
- Name of the country instead of name of the port,
- Unknown abbreviation,
- Information "unavailable",
- Information "unidentified",
- Null or blank space.

This error is considered important in a heavy traffic area. It is very useful to know the correct information about the destination of the vessel shown on AIS receiver that is to be avoided.

Other problems related to AIS device – AIS device cannot be used for:

- Collision avoidance at sea,
- Separation scheme zones,
- Search and rescue.

In the analysis regarding the types of technical errors (*T*) two possible working conditions can be observed, i.e.:

- Condition D_1 (technical errors $t_1 t_2$),
- Condition D_2 (technical errors t_1 - t_2).

When the device is in working condition (D_1) – it continues functioning regardless of the error which occurred. In case AIS device is in working condition (D_2) , it does not continue to function correctly due to the effect of the error. Since with AIS device there are two possible conditions D_1 and D_2 it is necessary to classify technical errors (*T*) and their effects on the functioning



Figure 5. Ships showing wrong length. Source: Abbas Harati-Mokhtari (Liverpool John Moores University, UK) available at: http://94.211.137.110/middenlimburg/downloads/documenten/pdf/AIS_Human_Factors.pdf, 21.12.2011.

of AIS device according to device condition $(D_1 \text{ or } D_2)$. Description of technical errors of (7) AIS device:

- t, no transmission / AIS device stops transmitting information;
- t₂ no reception on working frequencies/ AIS device stops transmitting on all channels (n);
- t, general error / AIS device stops transmitting on all channels (n);
- no information on position / AIS device continues functioning using internal GPS device;
- *t*_s no speed over ground / AIS device continues functioning but does not show information on speed;
- *t*₆ no course over ground / AIS device continues functioning but does not show information on course;
- t₇ no information on the *rate of turn* ROT (eng. *Rate of Turn* device showing intensity of alteration of course and side to which the vessel will turn).

The requirement for AIS is correct functioning. In case any of the errors occurs (H or T) the device is faulty. The analysis of possible errors is shown by algorithms of conditions D_1 and D_2 (Figures 4 and 7).

5. PROPOSAL OF AIS IMPROVEMENT

The role of AIS in collision avoidance at sea is significant. AIS device shows ready-made information which are relevant for collision avoidance. As a difference from ARPA (eng. *Automatic RAdar Plotting Aid*) which calculates data, AIS receives ready-made information from other ships' gyro compasses. The information is shown on ECDIS or on radar display. The correct installation of AIS device and its integration with navigational equipment, accuracy of data hand-fed into the system and the ability of seafarers to correctly understand information received by AIS device are



Figure 6. Ships showing wrong breadth. Source: Abbas Harati-Mokhtari (Liverpool John Moores University, UK available at: http://94.211.137.110/middenlimburg/downloads/documenten/pdf/AIS_Human_Factors.pdf, Dec. 21, .2011.





important to avoid problems related to the functioning of the device. The installation of AIS device and seafarer training (Figure 8) in the use of this equipment are very important which was not really considered a priority in the beginnings.

AIS information received from VTS system are important in the investigation of maritime accidents. The information consist of accurate time, GPS position, course over ground, speed over ground, ship's rate of turn and all of them are included in maritime



accident investigation as they are of great help in solving such accidents.

With the introduction of new measures, the following factors are proposed:

1. A1 denotes correct use of AIS device in port. In practice it has been observed that after manoeuvring and berthing the vessel the master or officer of watch do not change the ship's status on AIS device. Therefore, it shows the information for the vessel as being underway instead of

"berthed".

- 2. A2 denotes the correct use of the device while underway. It refers to updating of ship's draught, port of destination, time of arrival to port of destination, type of cargo that the ship is carrying, etc.
- 3. A3 refers to functioning of AIS device on longer distances. AIS device functioned on VHF frequencies on shorter distances. Nowadays, the satellite AIS signal is available in different parts of the world and this availability is applied via *Satellite Based System AIS-S*. The device does not require



any action from the vessel as a difference from *Long Range Identification Tracking- LRIT* (Long Range Identification and Tracking, 2012).

- 4. A4 refers to the correct use of the device by the officer of watch. It refers to his acquaintance with the device and a possible need for the familiarization with the device before starting to use it.
- 5. A5 refers to testing the device with coastal stations. It is necessary to test the device with a coastal station to confirm the correct reception or transmission.
- 6. A6 refers to testing the device so as to confirm its correct functioning.

6. CONCLUSION

It has been found out that AIS provides more accurate information than ARPA device; however AIS is not a device reliable enough for avoiding collisions at sea. AIS is not installed on all ships, and the quality of data input by the navigator is questionable. Besides all mentioned above AIS exhibits technical imperfections that should be removed to achieve its full functionality in navigation.

The control of the entire system in determined time intervals, checking of information accuracy and removal of defects are proposed Besides technical errors human errors also occur. Regarding the frequency of human errors additional attention and training of operators themselves are considered necessary in order to follow the development of AIS and its upgrade.

Measures are proposed that are necessary to minimize the error caused mainly by human operator with the introduction of time intervals required for familiarization with the device itself before starting to use it.

The entire system is still in an initial phase of its development so that its still wider and probably more enhanced application can be expected in the forthcoming times.

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Figure 9. Algorithm of improvement of seafarers' training for AIS equipment.

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Proposal of Measures for Increasing the Safety Level of Inland Navigation

Pero Vidan, Andrzej Grzadziela^a, Rino Bošnjak

Navigation along inland waterways was in history used only for the transportation of bulk cargo. However, in the last two centuries inland waterways have been used for transporting containers, general and liquid cargo. The density of navigation in the world waterways is considerable, especially because it is more profitable, when compared to other modes of transport. The increase of the density of navigation along inland waterways has also caused the threats of various undesired occurrences like collisions, stranding, pollution etc. Their decrease may be realised through the implementation of various measures relating to the safety of navigation along inland waterways.

In this paper the authors will present new measures aimed at the increase of the traffic volume. It is expected that the implementation of new measures will enable optimal planning of navigation and better awareness of potential threats in the waterways.

KEY WORDS

- ~ marketing of maritime ports
- ~ quantitative-qualitative analysis
- ~ Markov model
- ~ CRM concept

University of Split, Faculty of Maritime Studies, Zrinsko-Frankopanska 38, 21000 Split, Croatia

e-mail: pvidan@pfst.hr, rbosnjak@pfst.hr

- a. Faculty of Mechanical & Electrical Engineering, Gdynia, Poland
- e-mail: a.grzadziela@amw.gdynia.pl

1. SAFETY OF NAVIGATION AND INLAND WATERWAYS

Safety of navigation assumes a set of conditions and requirements to be fulfilled by inland waterways, ports, navigation, ships and other vessels, the crew and supervision of implementation of navigational safety regulations. Inland waterways refer to the belt of inland waters of particular depths and widths along which navigation is performed. It can be presented by a general model of route between destinations A and B (Figure 1).

2. PROPOSAL OF NEW MEASURES

During the navigation along inland waterways various decisions are made. Part of the decisions is based on the information from the environment. Among other subjects, they refer to:

- Limited waterway along the river course,
- Hydrographic characteristics,
- Meteorological characteristics,
- Quantity of traffic in a limited area,
- Limited possibility of maneuvering,
- Branching, vicinity of towns and industrial plants, and
- Human error.

Inland navigation is specific also because of the limitation of the waterway along the river course, coastline of rivers, lakes and channels, river widths, number of meanders and radius of meanders, shallow water, water level, dams and locks, and other navigation obstacles, like cables, bridges etc. Such navigation requires frequent maneuvering and consequently additional attention of the navigator. It is therefore necessary to propose a system of measures for defining limitations of a waterway calculating the coefficients of:





- Width of an inland waterway (K_w),
- Indentedness of an inland waterway (K_i), and
- Complexity of an inland waterway (K_c).

The coefficient of width is the ratio between the full length of the waterway from the port A to the port B (*I*) and the width of the waterway (*w*):

$$K_w = \frac{I}{w} \tag{1}$$

The coefficient of indentedness of an inland waterway (K_i) is the ratio between the full length of the river coastline (I_d) and the full length of the inland waterway (I):

$$K_i = \frac{I_{cl}}{I} \tag{2}$$

The coefficient of complexity of an inland waterway (K_{s_1}) is the ratio between the total number of navigation threats ($\sum o$) and the length of the inland waterway (I). Navigation threats are threats like dangerous depths, shallow waters, locks, bridges, cables etc.

$$K_{s} = \frac{\sum_{i=1}^{n} o_{i}}{I}$$
(3)

Navigation along inland waterways is considered dangerous also because of unfavourable hydrographic characteristics of a waterway, especially when the water level and water currents reach extreme values. Water level and water currents may cause difficulties when manoeuvring the ship and cause complications in case of pollution, passing by other ships, drifts in rivers bends, entering channels, undesired increase or decrease of speed, dangerous objects brought by current, etc. When estimating the safety of sailing along a particular inland waterway it is proposed to use a coefficient of meander state of the river (K_w) (4). It is the ratio between the sum of river bends ($\sum_{i=1}^{n} w$) and the full length of the waterway and it provides information on the meander state of the river course.



As in maritime navigation, meteorological properties may be a threat for ships in inland navigation in terms of safe manoeuvring of the ship. The ice may cause damage to the hull. The fog and reduced visibility jeopardise a safe manoeuvring of the ship in narrow passages and along the areas of higher traffic intensity. The wind may cause the drift of the ship in risky areas such as entrances to estuaries and channels, or it may lower the water level, as, for instance, in La Plata- Buenos Aires (Port of Buenos Aires, 2008).

(4)

From the aspect of meteorological influences, safe passage may be expressed by a coefficient of safe passage (K_{sap}). It equals the ratio between the total number of navigable days of safe passage ($\sum_{n=1}^{n} d_n$) and the number of days in a year:

$$K_{sap} = \frac{\sum_{i=1}^{n} d_i}{365}$$
(5)

Visibility coefficient (K_{vsb}) is the ratio between the total number of days with reduced visibility ($\sum_{i=1}^{n} d_{nsb}$) and the number of days in a year:

$$K_{\rm vsb} = \frac{\sum_{i=1}^{i} d_{\rm rvsb_i}}{365} \tag{6}$$

It is considered that the intensity of traffic in limited area of inland waterways is relatively high. In inland waterways, it is often navigated in the vicinity of locks, dams, industrial areas, narrow channels etc. Due to high traffic intensity in a relatively small area there is a higher probability of collision with other ships. Therefore, traffic density (G_p) of a waterway can be measured. It equals the ratio between the total number of ships (V_b) and the length of the waterway (I):

$$G_{p} = \frac{\sum_{i=1}^{n} V_{b_{i}}}{l}$$

$$\tag{7}$$

In inland navigation there are relatively stronger water currents than in maritime navigation. Because of the nature of a waterway, ship maneuverings are more frequent and the distances from land and navigating objects are smaller in comparison to maritime coastal navigation.

Besides navigational hazards such as shallow waters, junctions of waterways and the like, inland waterways are intersected by road and railway bridges. They are additional threat to the safety of navigation. Rivers connect towns with the sea and have numerous tributaries for irrigation of agricultural areas, operation of industrial plants etc. Ports in such areas are of smaller capacity than marine ports, but they have a significant trend of traffic increase (Jolić, 2006). It is proposed to use measures for estimating potential human, material and other hazards (Kasum et al., 2006). In this way the density of various infrastructures in inland waterways can be measured, for instance:

- Density of inhabited places along the waterway G_{nm},
- Population density along the waterway G_{na} , and
- Density of potentially jeopardized objects along the waterway G_{no} .

It is considered that the density of inhabited places along the waterway (G_{nm}) equals the ratio between the total number of inhabited places along the waterway (N_m) and the length of the waterway (I) (Kasum et al., 2010; Vidan et al., 2009; Vidan et al., 2012):

$$G_{nm} = \frac{\sum_{i=1}^{n} N_{m_i}}{l}$$
(8)

Population density along the waterway (G_{na}) is the ratio between the number of inhabitants there (S) and the length of the waterway (I) (Kasum, et al, 2010; Vidan, et al 2012):

$$G_{na} = \frac{\sum_{i=1}^{n} S_i}{l}$$
(9)

The density of potentially jeopardized objects along the waterway (G_{no}) is considered to equal the ratio between the number of jeopardized objects (O) and the length of the waterway (I) (Kasum et al., 2010; Vidan et al., 2012):

$$G_{no} = \frac{\sum_{i=1}^{n} O_i}{l}$$
(10)

Human negligence is a crucial factor in the situation of crisis. It can refer to accidental pollution of water, erroneously operating dams and lock, wrong estimates when maneuvering and the like. The coefficient of hazard due to human error can be expressed as a ratio between the number of accidents caused by human error ($\sum_{i=1}^{n} n_{im}$) and the length of the inland waterway (*I*) (Inland Navigation Europe, 2007; Vidan et al., 2012):

$$K_{hm} = \frac{\sum_{i=1}^{n} n_{hm_i}}{I}$$
(11)

In order to increase safety factors in inland waterways, the results presented in the proposed measures might be included in the information content of river maps and navigational publications. For example, the proposed measure of the coefficient of hazard due to human error could be presented as:

- Red mark
- Yellow mark △, and
- Blue mark



Figure 2. Example of areas with different values of the estimated coefficients of human errors in navigational area of the upper Mississippi river. Source: http://www2.mvr.usace.army.mil/NIC2/mrcharts.cfm

The red mark indicates the area with frequent accidents caused by human error.

The yellow mark indicates the area with infrequent accidents caused by human errors.

The blue mark indicates the area with no accidents caused by human error.

The example of navigation along the upper Mississippi river shows the estimated coefficients of hazard due to human error (Figure 2). According to publications (buergerimstaat.de), it is estimated that the Mississippi's locks, and curves are considered hazardous for navigation due to a possible human error. The similar situation relates to bridges due to their relatively low height.

In the areas close to obstacles, such as dams, junctions, bridges, shallow waters and channels the possibility of accident caused by human error is relatively high, and the relevant coefficients reach middle values (Vidan et al., 2012).

The areas with no hazards that have relatively low

coefficients of hazard caused by human error are in the areas where navigation is unobstructed, traffic density is low or medium, depths are safe etc. (Vidan et al., 2012).

It is necessary to apply the adequate statistical processing of the valid data in real examples. In various countries such data are often unobtainable, as they are considered protected data related to crucial USA and/or national infrastructures.

3. IMPLEMENTATION OF NEW MEASURES

It is proposed to regard all information related to the safety of navigation along inland waterways as *Inland Water Safety Information – IWSI*. They should be distributed to the user by:

- Regular broadcasting of radio notices related to IWSI,
- Publishing them in river navigation charts,
- Publishing them in river navigational publications.

Regular broadcast of radio notices related to IWSI need to be classified as *Search and Rescue-SAR*, *Meteo-MET* and *Navigational Warnings-NAVWAR* and the national coordinator for each category need to be appointed (Vidan, et al, 2012). In order to follow the data on the safety of the waterway it is necessary to establish the *Inland Water Information Service-IWIS* for all critical areas. The data may be available by means of VHF (*Very High Frequency*) or MF (*Medium Frequency*) devices, NAVTEX, INMARSAT etc. It is also proposed to organise the global coordination service of such information – *World Wide Inland Water Information Service* – *WWIWIS* (Kasum et al., 2010).

It is necessary to establish standards in the production of river navigation charts similar to *Electronics Chart Display and Information System-ECDIS* that are already in use in river navigation. In order to increase the navigation safety level it is necessary to expand their information content with, for instance, new proposed measures.

It is necessary to propose standards in the production of river navigational publications by integrating IWSI into their information content that otherwise would congest the content of river navigation charts.

It is also proposed to use the suggested approach in the development of new measures in order to establish international standards and their world-wide implementation.

4. CONCLUSION

Inland waterway traffic is considered to be the most costeffective form of land transportation. Development of safety on inland waterways was lagging behind the rate of traffic increase on them and largely lagging behind the development of safety in maritime transport. In order to increase the level of safety of navigation, new measures of safety and security of inland navigation waterways are proposed. It is expected to reach an increase of safety and security by implementing new measures. It has been proposed to increase the safety and security of waterways by new marking in inland navigation charts. Possible human errors that occur as a result of collision avoidance manoeuvre on waterways can be reduced by new approach to labelling inland waterways in charts.

The use of inland waterways in global traffic is constantly increasing. The increase of traffic consequently increases the possibility of collision and of other undesired events. By increasing the navigational safety level it is possible to decrease consequential damages.

It is necessary to develop international standards relating to *Inland Water Safety Information – IWSI* and the like. In order to increase their accuracy, availability and reliability it is proposed to establish a global coordination service – *World Wide Inland Water Information Service - WWIWIS*. It is proposed to distribute IWSI to the users by regular broadcasting of radio notices, by publishing river navigation charts and navigational publications.

It is assumed that the implementation of the new measures proposed in this paper will significantly affect the increase of safety level of inland waterway navigation.

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Structural Modifications for Improving the Tribological Properties of the Cylinder Unit in Two-stroke Slow Speed Marine Diesel Engines

Branko Lalić, Ivan Komar, Đorđe Dobrota

Increasing the energy efficiency of the marine propulsion systems currently represents one of the priorities that have been placed in front of all subjects of maritime shipping market. More and more ship owners aspired to larger and more powerful diesel engines demanded from the marine engine manufacturers to implement various technological modifications to increase the engine efficiency, extend the life of engine components, and thus prolonge regular overhauling period of them. One of the way to meet these demands, among other things, is to improve the tribological characteristics of engine components. The aim of this paper is to present structural modification of tribological system "cylinder liner - piston ring - piston" of large bore slow speed marine diesel engine to reduce friction problems in mentioned system

KEY WORDS

- ~ Friction,
- ~ Wear,
- ~ Material selection,
- ~ Coating tribology,
- ~ TriboPack.

University of Split, Faculty of Maritime Studies, Zrinsko-Frankopanska 38, 21000 Split, Croatia

e-mail: blalic@pfst.hr, ivan.komar@pfst.hr, ddobrota@pfst.hr

1. INTRODUCTION

The current trend in development of shipping and technology in general has outcome in improving the efficiency of the large two-stroke low-speed marine diesel engines with cylinder unit modifications. Those modifications have resulted in improvement of tribological properties of tribosystem "cylinder liner - piston ring - piston".

This paper clearly shows all the modifications that are today's standard in the construction of large two-stroke low-speed marine diesel engines. The targets of structural modifications are (Wärtsilä Sulzer, 2009):

- To give the customer the best standard to achieve an extended TBO (**T**ime **B**etween **O**verhauling) up to three years for hot parts.
- To allow the customer to reduce the cylinder oil feed rate to values of approximate 1.2 g/kWh with no risk of excessive wear.
- To reduce the wear rate for the cylinder liner to 0.05 mm/1000 working hours or less over a wide load range of the engine.
- To reduce the risk of failing during running-in period as well as sea trial and generally to reduce the running-in time to 10 hours and less.

All structural modifications that are now standard applied are shown in Figure 1.





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2. STRUCTURAL MODIFICATIONS

2.1. Cylinder liner insulation

The comparison of temperature of cylinder liner with and without so called tribological insulation is shown in Figure 2. The same two diesel engines Wärtsilä Sulzer RTA84T are taken for comparation. Red line shows the temperature of engine cylinder liners of RTA84T engine without tribological insulation. It is easy to see that the cylinder liner operating temperature overlaps with the dew point temperature of water and low temperature corrosion is presented on almost the entire length of the stroke. Blue line shows the temperature of cylinder liner of RTA84T engine with tribological insulation in the TDC (**T**op **D**ead **C**entre) area and in the middle of the stroke, indicating that the operating temperature of the cylinder liner deviates significantly from the dew point temperature, which leads to specific wear in diameter under 0.05 mm/1000 working hours. The position of instalation of additional insulation and its effect on the specific wear is shown in Figure 3.

Cold liner surface leads to cold corrosion and cold corrosion leads to breaking out corroded hard phase, increased friction and scuffing and high wear rate. The sulphuric acid causes so called low temperature corrosion. That is a well understood problem which is all about temperature control of the cylinder liner running surface. The cylinder lube oil does a part of the job by neutralizing the sulphuric acid but the rest has to be done by the engine design. In this sense both 4-stroke and 2-stroke engines are in a similar position. Because of its longer stroke and its longer residence time of the corrosive combustion residues on the liner surface, the 2-stroke engines needs more accurate temperature control (Figure 3). Using proper tools it is possible to predict quite accurately the liner surface temperature as well as the critical temperature line below where corrosion may take place for different engine ratings (Figure 2). Based on these results the cylinder liner surface temperature can be adjusted by means of insulated cooling bores and midstroke area of the cylinder liner.

Red area (Figure 3) indicates positions with increased friction and scuffing and high wear rate on the engine without tribological insulation. Using additional insulation of the cylinder liner prevents condensation of sulphuric acid and corrosion attack and improves wear rate indicated as blue area in Figure 3.

2.2. Multi-level lubrication and improved cylinder liner lubricating oil injection timing

Another structural modification in TriboPack system of slow speed two stroke crosshead marine diesel engines is multi-level cylinder liner lubrication with the use of two rows of cylinder lubricator quills (Figure 4). Multi-level lubrication gives much better control of the oil-film thickness over the whole piston stroke together with an adequate oil refreshing rate, even in the TDC region of top ring travel (Bar, 2005). Two stroke crosshead operation of marine engine has no non-working stroke during which the oil film on the wall can be reformed. However, this problem has also been solved by improvement in lubricating oil injection timing system. A few engine manufacturers have recently developed a lubricating oil injection timing system similar to the fuel injection like MAN B&W Adaptive Cylinder oil Control system and Wärtsilä Sulzer Pulse Lubricating System.

2.2.1. Cylinder liner lubricating oil required properties

A good cylinder lubricant must have essential properties as follows:

It must reduce sliding friction between the rings and the liner to the minimum, thereby minimizing metal to metal contact and frictional wear. Wear is defined as damage to a solid surface that generally involves progressive loss of material and is due to relative motion between that surface and a contacting substance or substances (ASM International Handbook Committee, 1992). Dispersants and detergents and other additives, which are added to cylinder oil, are additives that are used to suspend oil-insoluble resinous oxidation products and particulate contaminants in the bulk oil. They minimize sludge formation, particulate-related







Figure 3. Cylinder liner insulation / temperature control. Source: "The TriboPack for Sulzer RTA engines", (2009), Wärtsilä Sulzer.

abrasive wear, viscosity increasing, and oxidation-related deposit formation.

- It must possess adequate viscosity at high working temperature and still be sufficiently fluid to spread over the entire working surface and form a good adsorbed oil film. Multi-level lubrication systems have increased lubricating oil film thickness considerably. The inclusion of additives like polymethacrylates and ethylene-propylene co-polymers (OCP) helps in maintaining the requisite oil film thickness due to its molecular bending with porous cylinder liner.
- It must form an effective seal in conjunction with the piston rings, preventing from gas "blowing-by" and burning away of the oil film and lack of compression. Cylinder lubricating oil is highly viscous, which hampers its spread ability thereby resulting in uneven wear on the cylinder liner. It will ultimately lead to blow down which will aggravate lubrication problems further.
- It must burn cleanly leaving a deposit as little and soft as possible.
- It must prevent effectively building up of deposits in the piston ring zone and in exhaust gas ports of two stroke engines.
- It must neutralize effectively the corrosive effect of mineral acid formed during combustion of the fuel. For example



Figure 4. Cylinder liner with multi-level lubrication. Source: "The TriboPack for Sulzer RTA engines", (2009), Wärtsilä Sulzer.

a typical large bore marine engine developing 20000 kW with a daily fuel consumption of abt. 76000 kg burning a 700 mm2/s at 50°C with a sulphur content up to 3,5% the total weight of sulphur burnt would be 3048 kg or 3 tons. If all these wer converted into SO3 and then into sulphuric acid, these would produce 10 tons of highly corrosive sulphuric acid. But reliable analysis indicates that only 10 to 15% is converted into sulphuric acid, and that amount of 450 Kg of sulphuric acid per day may lead to highly corrosive wear. This probleme can be solved by introduction cylinder liner lubricating oil with higher TBN (Total Base Number) values such as 60-80 TBN. Furthermore it is ensured that the cylinder liner temperature doesn't go below the dew point temperature of Sulphuric acid in the upper zone and thus the corrosion is reduced to a minimum value.

2.3. Cylinder liner fully deep honed as TriboPack structural modification

Honing is a procedure treating the finest metal surfaces in order to achieve the required accuracy and quality of machined surfaces. Honing, as well as the processes of scraping, milling, grinding, or cutting off metal materials in its activity is limited to a relatively thin surface layer of the working piece and is mainly caused by cold plastic deformation, but with not far-reaching influence on the structure and properties of materials.

During the process of honing it is very important that the working surface is washed over with considerable volume of cooling and lubricating liquid. The working surface should be cooled down to avoid structural changes due to recrystallization process and release. In addition to rinsing away the metal dust generated by honing and pulling out grinding wheel particles. Research in this area is focused on the application of new cooling and lubrication liquids. The aim of honing is the extension of service life of cylinders liner and piston rings. Severe operating conditions of large bore marine diesel engines often result in increased wear of the cylinder liners and lead to frequent fractures and damages of piston rings. Today, engines can operate with an average temperature of the cylinder liner surface even over 250° C, in some areas. As a consequence is that the piston rings are subjected to higher loads, which can quickly result in excessive wear of cylinder liners and itself. Thus, the imperfection of the cylinder liner surface, caused by the environment with respect to wear can be corrected and prevented by honing process (lvić, Smoljan, Pedišić, Perić, 2006).

There are many ways to create detrimental surface properties for a machined surface. One of the most common in the engine industry is so called shatter marks that is normally a result of machine tool vibrations caused by mismatching machining parameters. Geometrical magnitude ranges from only a few microns and thus stays well within normal drawing tolerances. However, the counter surface, the piston rings in this context, sometimes feels them with severe consequences. By honing the shatter marks can be reduced and by deep honing even eliminated. Additionally the deep honing leaves the wear resistant hard phases unbroken, see Figure 5. Neither plateau honing nor wide honing showed the desired improvements in







Figure 7. "Tribo pack" - Cylinder liner machining. Source: "The TriboPack for Sulzer RTA engines", (2009), Wärtsilä Sulzer.

- Avoidance of liner polishing.
- APR consists of alloyed steel with a high yield point under increased temperature to remain in shape.

The benefit of the APR can be easily judged from the superior cleanliness of the piston top land and piston ring area. Cleanliness is a prerequisite to stable operation over long running period.



Figure 8. "Tribo pack" - Anti Polishing Ring position. Source: "The TriboPack for Sulzer RTA engines", (2009), Wärtsilä Sulzer.

Figure 6. "Tribo pack" - Anti Polishing Ring position. Source: "The TriboPack for Sulzer RTA engines", (2009), Wärtsilä Sulzer.

piston running wear. Only deep honing over the full stroke was completly successful with results as follows:

- Deep honing results in a smooth surface without broken hard phase.
- Building-up of a proper hydrodynamic lubrication is only possible on a plane surface.
- Every disturbance on the surface leads to increased friction between protruding materials.

Deep honing is standard for large bore two stroke marine engines since 1997.

2.4. TriboPack anti-polishing ring (APR)

Functions of the Anti-polishing ring (APR), Figure 6, are:

- Reduced liner top diameter with APR, where the piston crown gets in and out.
- Continuous scraping-off of deposits built up on the piston crown.
- Avoidance of contact with the liner wall along the stroke due increased clearance because of removed coke from the crown.
- Undisturbed oil film mid stroke.





Figure 9. Typical time scale for radial wear of a Hard coated / Semi Alucoat Ring Package. Source: http://www.daros.se/

Figure 7 shows condition of piston crown with installed APR with cylinder liner lubricant oil feed rate of 1,1 g/kWh, while Figure 8 shows condition of the piston crown without APR with same cylinder liner lubricant oil feed rate causing increased deposits on the piston crown.

2.5. Piston rings coatings as TriboPack structural modification

The use of coatings on piston rings has become necessary for optimum time between overhaul on larger marine engines. There is a continuing trend to increase the power output of all engines. Higher power output means higher heat load and higher mechanical load on piston rings and cylinder liners. This has lead to the development of new piston ring coatings with excellent wear properties under increasingly load running conditions.

There are two main categories of functional piston ring coatings that are currently being used in large-bore engines: runningin coatings and/or wear-resistant coatings, Figure 9 (daros.se, 2012).

Running-in coatings

The soft running-in coating is applied to the ring's running face in order to seal properly within the first few hours of operation (during shop-testing or after cylindre unit overhaul). Another function of the running-in coating is to gently finish the running surface on the cylinder liner during the first few hundred hours after installation of a new liner. The running-in coating is applied directly to the base material or as an addition to a wear-resistant coating.

Wear-resistant coatings on running face

Cermets, as a composite material composed of ceramic (Cer) and metalic (Met) materials represent an important family of thermally sprayed wear-resistant coatings. Cermets are applied to the running face of the ring for highly loaded applications. The Cermet coatings prolong the lifetime of the ring package significantly, as shown in Figure 9. All Cermets are applied with plasma-spraying equipment. Classic example of todays piston rings and related coatings (MAN B&W Low Speed Large Bore Engine - Now with high Power Concentration", 2010) is shown in Figure 10.

2.6. Piston rings groove coatings

It is well known that due to the penetration of hard solid particles in the space between the ring and the piston groves leads to perforation of horizontal working surface of piston ring grove and creates so called "Pockmark surface". Ultimately, this development leads to scuffing of piston ring in its groves, and the loss of its sealing ability. To prevent this problem horizontal



Figure 10. Typical time scale for radial wear of a Hard coated / Semi Alucoat Ring Package. Source: Unknown, MAN B&W Low Speed Large Bore Engine - Now with high Power Concentration, (2010), Copenhagen: MAN Diesel. surface of piston ring groves is coated with chromium layer, which showed very good results, and contributed to extend time between overhauling of the cylinder unit.

3. CONCLUSIONS

This paper describes the structural modification of the tribological system "cylinder liner - piston rings - piston", so-called "TriboPack", of large bore slow speed marine diesel engines, which is the basis for achieving optimum working results on grooving maritime market. Furthermore, future improvement in overcoming the problem of friction and wear inevitably leads to the construction of even larger and stronger large bore low-speed marine diesel engines that will fully satisfy all requirements

of the maritime market.

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Health and Pension Insurance of Seafarers in the Republic of Croatia

Blanka Ivančić-Kačer

In practice issues with no clear-cut answers are raised almost on a daily basis. The author deals with some very topical issues relating to pension and health insurance in the Republic of Croatia – the issues of accelerated years of pensionable service for seafarers, pension bonuses and the very meaning of the term seafarer.

KEY WORDS

- ~ Pension insurance
- ~ Health insurance
- ~ Accelerated years of pensionable service for seafarers
- ~ Seafarer pension bonus
- ~ Seafarers in the Republic of Croatia

University of Split, Faculty of Maritime Studies, Zrinsko-Frankopanska 38, 21000 Split, Croatia

e-mail: bkacer@pfst.hr

1. INTRODUCTION

Throughout the world (i.e. this is a worldwide, global trend, at least in the so called developed societies) our time is characterized by great social sensitivity and conflict (often dramatic) between the substantially or completely opposing attitudes on whether we are doing everything we can in this area or far less than that, as well as where the limits of the possible objectively lie. Within the framework of the general concept of social issues, health and pension insurance certainly have a special place. That makes the issues of health and pension insurance of seafarers more than worthy of scientific analysis and study, the goal being first to clearly present the individual issues and then to analyse them de lege lata in Croatian law, including the de lege ferenda proposals. We wish to bring into the foreground two possible solutions to the present legal issues - the first and the best (because it best fulfils the legal safety and rule of law requirements) is the appropriate modification of the normative framework (either by a new act or amendment of the present act), the second (a necessary evil of sorts or a temporary solution, e.g. because the reaction time of the legislator is too long) is the achievement of change through the interpretation process, within which, in accordance with the best standards applicable in the acquis communautaire, the target or teleological interpretation have a special place. In so doing, at least in principle, ratio legis is that the seafarer (partly because of the seafarer, but largely also to protect the wider interests of the entire community, because the unsatisfactory position of seafarers is causing ever decreasing numbers of people to work in this branch of the economy, which is surely one of the strategic branches). In spite of being a branch of strategic interest, it is simultaneously a branch in which there exists an immense disproportion between the declaratively very strong support in every sense and the actual measures taken, including the appropriate legal framework, which fall far behind what could be called a real and appropriate support. The list of possible examples of legislative shortcomings is long, as clearly manifested in the fact that the Croatian positive legislation unfortunately does not even have the legal definition of the term seafarer, although the term is used (Šimac, 1999; Primorac, 2008), and there is a very real possibility of discrepancy with the Maritime Labour Convention (Maritime Labour Convention, 2012), which does not recognize the duality of the terms seafarer and crew member.

2. LEGAL SOURCES

The Constitution of the Republic of Croatia (Constitution of the Republic of Croatia, 1990; Constitution of the Republic of Croatia, 1997; Constitution of the Republic of Croatia, 1998; Constitution of the Republic of Croatia, 2000; Constitution of the Republic of Croatia, 2001; Constitution of the Republic of Croatia, 2001a; Constitution of the Republic of Croatia, 2001b; Constitution of the Republic of Croatia, 2010) is the main legal source for this subject matter, as well as any other subject matter relating to the Croatian legal system. The Constitution only contains general provisions, and for a general provision to be effective, it must be further elaborated by legal acts and sublegal regulations. We will list the provisions of the Constitution which served as the basis for the adoption of the acts which further elaborated these principles, making it possible for a part (content-wise) of the declaration to cross over to the stage of something operationalized and efficient, allowing the application of the general constitutional provisions to everyday life.

Given the topic of this paper, the key legal sources are the regulations governing the pension and health insurance of seafarers and, of course, the Maritime Code (Maritime code, 2004; Maritime code, 2007; Maritime code, 2008; Maritime code, 2011), defining a number of key terms like, e.g. ship and boat, but unfortunately not the term seafarer. Since the aforementioned regulations are special regulations which, as a rule, only partially deviate from the general solutions, the legal sources also include the so called empowering acts, i.e. Pension Insurance Act (Pension Insurance Act, 1998; Pension Insurance Act, 2000; Pension Insurance Act, 2001; Pension Insurance Act, 2001a; Pension Insurance Act, 2002; Pension Insurance Act, 2003; Pension Insurance Act, 2004; Pension Insurance Act, 2004a; Pension Insurance Act, 2005; Pension Insurance Act, 2007; Pension Insurance Act, 2007a; Pension Insurance Act, 2008; Pension Insurance Act, 2010; Pension Insurance Act, 2010a; Pension Insurance Act, 2010b; Pension Insurance Act, 2011; Pension Insurance Act, 2011a), Act on Insurance with Increased Duration (Act on Insurance with Increased Duration, 1999; Act on Insurance with Increased Duration, 2007; Act on Insurance with Increased Duration, 2008), Mandatory Health Insurance

Act (Mandatory Health Insurance Act, 2008), Labour Act (Labour Act, 2009; Labour Act, 2011) and Act on the Addition to Pensions Realised under the Pension Insurance Act (Act on the Addition to Pensions, 2007; Act on the Addition to Pensions, 2011).

Of course, every other regulation, of any level, in any way dealing with this problem area should also be considered as such.

International agreements, which in accordance with Article 141 of the Constitution⁽¹⁾ have legal force above the law, are also legal sources, under three conditions. First, that they have been published, second that they have been ratified and third, that they entered into force and effect (the third point is important because it often takes months, even years for the conditions for entry into force of international agreements to be met, most frequently the number of signatory countries).

Although the Republic of Croatia is as yet not a member of the EU, EU guidelines and other documents constituting the community acquis or *acquis communautaire* have a vital role.

The informal legal sources are the legal science and judicial practice as legal sources *sui generis*. Judicial practice acts through the power of argument, but also through the argument of power, because higher courts have the authority to impose their legal opinions on lower courts, while the legal science acts merely through the power of argument, due to the non-existence of obligation to accept and apply it.

3. AN OVERVIEW OF POSITIVE LEGISLATION DE LEGE LATA

As previously mentioned, until the normative framework is adequately modified by the legislator, the resolution of the present legal issues can be sought in the interpretation process which is often complex and requires both knowledge and skill. Interpretation is "...a mental activity revealing the possible meanings of legal provisions and in them the hypotheses, searches, the identification of the offence and sanction, and deciding which of the possible solutions is the best" (Visković, 2001). Since legal norm is an assembly of words endowed with certain meaning, language interpretation comes first. A schoolbook example is the pun: "You will go return not die." (Kačer, 2011) It is followed by logical interpretation connoting the application of special principles of legal logic- argumentum a contrario, argumentum a minori ad maius, argumentum a maiori ad minus...There is also the historical method, expanded, narrowed down ... However, according to the rules applicable in



¹ International agreements concluded and ratified in accordance with the Constitution, which have been published and are in force are a part of the internal legal order of the Republic of Croatia and are above the law by their legal force. Their provisions may be amended or revoked only under the conditions and in the manner therein established or in keeping with the general rules of international law.

acquis communautaire, targeted or teleological interpretation has a special place. It examines the role of the legal norm in the society, arriving at the conclusion that its true meaning in a particular legal relation is the one best reflecting the prevailing social goals (Kačer, 2011). Since this method is decisive and final in the interpretation process, we used it to establish the actual meaning of the legal norms from this problem area.

The seafarer health and pension insurance legislation is notoriously special in comparison with that legally regulating these areas for everyone except those to whom special regulations apply. That means that we must first consider the general norms, establish whether there are any deviations in special regulations and if there are, which deviations have precedence if the principle of lex specialis derogat legi generali is applied. Due to the nature of things, the definition of the seafarer is the key information, i.e. the legal provision starting from which we must establish to whom the provisions governing the health and pension insurance of seafarers apply. Unfortunately, since such definition is absent from the Croatian positive legislation, we must make do with what we have, and that is the term "crew member", with a note that these two terms are not synonymous - the term seafarer is broader, because every crew member is simultaneously a seafarer, but a seafarer need not necessarily be a crew member and can also be an unemployed person of marine vocation (Primorac, 2008). We will now quote key parts of the law for what we are dealing with in this paper, noting that due to the limited space we were forced to limit ourselves only to the most relevant, with the suggestion that the readers, use the provided data⁽²⁾ to gain an insight into the integral legal text.

ACT ON INSURANCE WITH INCREASED DURATION (3), OG 71/99

Article 4. paragraph 2, section XV IN TRANSPORT 2. Workplaces in marine transport

1) Workplaces of on-board personnel on tankers transporting liquid fuel during unrestricted navigation and marine cabotage.

Every 12 months spent on such workplaces shall be counted as 15 months of pensionable service.

2) Workplaces of on-board personnel, with the exception of personnel under 1), on ships navigating the areas of

3 The quoted provision was put out of legal force by the latest amendment of the Maritime Code, by a nomotechnically best way, explicitly.

unrestricted navigation and marine cabotage 80% of the year. Every 12 months spent on such workplaces shall be counted as 14 months of pensionable service.

The fact that a virtual little war was waged between the representatives of seafarers (primarily their unions) for years, inter alia over the so called accelerated years of pensionable service or insurance with increased duration, leaves a very bad impression about the legal safety and rule of law. Someone obviously didn't do their work well, because the provision of the Act on Insurance with Increased Duration, dating back to the now distant 1999, was never put out of force, providing that the fact that even at that time this issue was not applicable to all seafarers, but merely to those paying their own contributions, is not decisive.

MARITIME CODE, OG 181/04. Chapter VIII. THE SHIP'S CREW 1. General provisions

Article 125.

- (1) Ship's crew shall consist of commander and other persons embarked for the purposes of performance of works on board and entered into the crew list.
- (2) When embarking on the ship in international navigation crew member shall have a concluded written work contract.

Article 128

- (1) A crew member of a ship in international navigation shall be liable for employment income tax payment based on earnings from work aboard a ship in international navigation and payment of contributions for all compulsory insurances.
- (2) The registration and cancellation of the compulsory pension scheme and the health insurance of a crew member of a ship in international navigation shall be made by the employer, i.e. the ship owner.

Article 129

- (1) The salary a crew member would earn for the same or similar jobs on a ship in national navigation, established by the minster by a special regulation, shall serve as a monthly basis for the calculation of contributions from Article 128, paragraph 1 of this Code.
- (2) The amount of the sailing bonus of a crew member of a ship in international navigation, not included in the taxable part of income, shall be established by the minister competent for financial issues.
- (3) The employer shall not be liable for the payment of taxes, surtaxes, contributions and other payments on disbursements to a crew member of a ship in international navigation.

² We are primarily referring to the website of the publisher of the Official Gazette of the Republic of Croatia – www.narodne-novine.nn.hr at which all regulations have been published in an integral form, and which is freely accessible to anyone and unrestricted (not even restricted by payment).

The provisions defining the crew member are very clear, however, a written work contract is proscribed only for international navigation. We are not convinced that this is in the best interest of seafarers, especially in view of the general provisions of the Law of Obligations stipulating that the lack of form can still convalidate. It is likewise relevant that it is proscribed that, although a seafarer in international navigation is liable for the payment of contributions for all compulsory insurance schemes, it is the employer who is liable for the registration and cancellation of the pension and health insurance. That means and must mean that the employer is also liable if it fails to make the registration and cancellation. It would also be a good idea if a seafarer could, if he/she wishes and if the employer fails to do so, could make the registration/cancellation on his/her own.

Official Gazette 76/07

Article 13.

Article 128 shall be amended and read as follows:

- (1) A crew member in international navigation, regardless of the ship's nationality, who has a permanent residence or a temporary residence in the Republic of Croatia (resident), shall be liable to employment income tax payment based on earnings from work aboard a ship in international navigation unless he sailed for 183 or more days in the year for which the income tax payment liability is established. The period of 183 days may be discontinuous.
- (6) The contributions paid in the course of a tax period for compulsory insurance schemes of the crew member referred to in Paragraph 1 herein shall also be accepted as tax deduction expenses in accordance with provisions of Article 129 of this Code.
- (7) The sum of the sailing bonus amount calculated in accordance with Paragraph 5 and the amounts of contributions paid in accordance with Paragraph 6 herein may not exceed the total amount of earnings from work aboard a ship in international navigation as specified in Paragraph 4 herein. The balance between the earnings reduced by the sailing bonus and the expenses for contributions shall be the income from employment which represents the basis to establish the income tax liability or the non-existence of such liability depending on the number of navigation days pursuant to Paragraph 1 herein.

Article 14.

Article 129. shall be amended and read as follows:

(1) A crew member in international navigation, regardless of the ship's nationality, shall be an insured person with a compulsory pension scheme in the Republic of Croatia if he or she has a permanent residence or a temporary residence (resident) in the Republic of Croatia and a compulsory medical insurance,

as well as occupational safety and health insurance if he or she has a permanent residence or an approved permanent sojourn in the Republic of Croatia, unless otherwise regulated by an interstate social insurance contract.

- (2) The registration of the compulsory pension scheme and the compulsory health insurance of the crew member referred to in Paragraph 1 herein, whose employer is a domestic corporate entity, and the cancellation thereof shall be made by the employer.
- (3) The registration of the compulsory pension scheme and the compulsory health insurance of the crew member referred to in Paragraph 1 herein, whose employer is a foreign corporate entity, and the cancellation thereof shall be made by a competent port authority.
- (4) The port authority shall not make the registration referred to in Paragraph 3 herein if the crew member referred to in Paragraph 1 herein supplies evidence to the port authority that he or she has a compulsory insurance provided by a foreign social insurance authority of the state with which the Republic of Croatia has concluded a social insurance contract.
- (5) The agency in charge of finding employment for seamen referred to in Article 125a, Paragraph 2 of this Code, as well as the seamen who have found employment on their own with a foreign employer or who have been employed by a foreign employer through the Croatian Employment Bureau shall be liable to submit to the competent port authority all the data that are needed for the registration of the compulsory pension scheme and the compulsory health insurance, as well as the cancellation thereof.
- (6) The day of boarding a ship shall be deemed the beginning of insurance of the crew member referred to in Paragraph 1 herein, while the day when he or she has been discharged from a ship shall be deemed the termination of insurance as evidenced by the seaman's book.
- (8) The crew member referred to in Paragraph 1 herein shall be liable to contributions payment and the payment of compulsory insurance contributions in line with the monthly basis that is used to calculate contributions and that is prescribed and announced by the Minister. The amount of the monthly basis that is used for the calculation of contributions shall be determined against the salary that the crew member would receive for the same or similar jobs aboard a ship in national navigation.
- (9) The liability and the type of contributions, as well as monthly sums of contributions to be paid shall be established by a decision of the Tax Administration shall be subject to regulations governing contributions for compulsory insurance schemes, as well as general tax regulations.

These amendments of the Maritime Code were primarily characterized by the modifications of the tax system, i.e. the



application of such modifications to seafarers. The fact that it is clearly stipulated that compulsory insurance scheme payments (both health and pension) are a tax deductible expense is of relevance. It is also important that there is a clear provision that "A crew member in international navigation, regardless of the ship's nationality, shall be an insured person with a compulsory pension scheme in the Republic of Croatia if he or she has a permanent residence or a temporary residence (resident) in the Republic of Croatia and a compulsory medical insurance, as well as occupational safety and health insurance if he or she has a permanent residence or an approved permanent sojourn in the Republic of Croatia, unless otherwise regulated by an interstate social insurance contract." (Maritime Code, 2007), as well as that apart from the clarity of this provision, it is also relevant that it took into consideration the fact that in practice it is often foreigners and not only the citizens of the Republic of Croatia who benefit from compulsory insurance schemes, and that they should therefore be liable to make payments if they have any of the legally proscribed relations with the Republic of Croatia.

AMENDMENTS OF THE MARITIME CODE, OG 146/08

Article 18

In Article 129, paragraph 2 is amended to read:

"(2) The registration of the compulsory pension scheme and the compulsory health insurance of the crew member referred to in paragraph 1 herein, whose employer, ship operator or company is a domestic legal person, shall be made by the employer, ship operator or the company."

In paragraph 3, the words "ship operator or the company" shall be added after the words "employer".

These amendments merely additionally define who makes the registration by adding the words ship operator or the company to term employer. In comparison with some other modifications, this is one that could have been avoided, i.e. this extension could easily have been achieved by the interpretation process. Possible damage is that if so many details were provided in this respect, in other cases the very interpretation, i.e. extension of application by way of interpretation can me aggravated by the observation that "had the legislator wanted it, he would certainly have changed it when he was so careful to enter this change by additionally listing ship operator and the company with the employer in Article 129, Paragraph 2 of the Maritime Code."

AMENDMENTS OF THE MARITIME CODE, OG 61/11

Article 11

In Article 125, paragraph 4 is added after paragraph 3 to read:

"(4) Working, living and social conditions of seafarers shall be governed by collective contract."

Article 12

In Article 126, paragraph 2, word "liner" is added after word "international".

Article 13

In Article 128, paragraph 2 is amended to read:

- "(2) For the achievement of the required 183 days from paragraph 1 of this Article for the year for which the income tax obligation is established, days spent on board, days spent travelling from place of residence to place of embarkation, days required for return trip, days of treatment of illnesses or injuries occurring on the way to the ship, on board or on return and days spent at professional training abroad shall be included." After paragraph 2, new paragraph 3 is added which reads:
- "(3) Days from paragraph 2 of this Article may include days spent on board, days spent travelling from place of residence to place of embarkation, days required for return trip, days of treatment of illnesses or injuries occurring on the way to the ship, on board or on return and days spent at professional training abroad, which were not calculated into the 183 days in the preceding year.

Article 14

After Article 129, Article 129 (a) is added which reads: "Article 129 (a)

- (1) To a crew member, regardless of the nationality and type of ship and in what capacity he/she embarked on the ship, every 12 months spent on board as member of crew of ship in international and national navigation shall be counted as 15 months of pensionable service.
- (2) The age limit for the obtainment of right to retirement of insured person – crew member pursuant to the Pension Insurance Act shall be 60 years of age, provided he/she has a minimum 15 years of pensionable service as crew member of ship in international and national navigation.
- (3) A crew member of a ship in international navigation shall be obligated to pay additional contribution and contribution for insurance with increased duration based on the monthly basis for the calculation of contributions for compulsory insurance schemes proscribed and published by the minister, as follows:

- additional pension insurance contribution for insurance with increased duration,

- additional pension insurance contribution based on individual capitalized savings for insurance with increased duration (for persons covered by such insurance).

- (4) The rate of additional contribution for insurance with increased duration from paragraph 1 of this Article for crew member from paragraph 3 herein shall be calculated in keeping with the applicable rate of increase of pensionable service by the application of the general act governing contributions.
- (5) The additional contribution for insurance with increased
duration for crew member from paragraph 3 herein shall be calculated and charged by the Tax Authority in the manner proscribed by Article 129, paragraph 9 of this Act.

- (6) The insurance with increased duration for crew member from paragraph 3 of this Article shall be calculated during the procedure of realization of his/her retirement right based on the certificate of the Tax Authority that additional contribution for insurance with increased duration was paid in full.
- (7) For crew member of ship in international navigation, the employer shall pay additional contribution and be subject to the calculation and payment of the contribution for insurance with increased duration, in accordance with the general act governing contributions, as follows:

- additional pension insurance contribution for insurance with increased duration,

- additional pension insurance contribution based on individual capitalized savings for insurance with increased duration (for persons covered by such insurance).

(8) The provisions of the general act governing contributions and general act governing pension insurance shall be applied in the appropriate manner to any issues not covered by this Act, relating to insurance with increased duration of crew members."

Article 69

Article 4, paragraph 2, section XV, indent 2: Workplaces in sea transport, Act on Insurance with Increased Duration (Official Gazette no. 71/99,46/07 and 41/08) shall cease to apply on the date of entry into force of this Act.

These are currently the most relevant amendments of the Maritime Code for seafarers for more than one reason. First, they are a part of the Croatian positive legislation and since they entered into force, until another change, all actions of seafarers must be governed by them. Second, they nullified the dual position of seafarers brought about by the illegal actions of the executive authorities, without the participation of the legislator. The third is something negative. Namely, having finally resolved the issue of the so called accelerated years of pensionable service (by the latest amendments of the Maritime Code), a new issue arose. The seafarers are now denied the pension bonus which has been an integral part of their pension since January 1, 2012, because they realized their pension rights under more favourable conditions or in a more favourable way in keeping with special regulations, in this case the Maritime Code - had someone anticipated this issue, it could have been prevented by a simple addition of text into the Maritime Code. Unfortunately, this was not done and it is now clear that we are facing a new (and probably long) fight, this time with the Bonus Act. The common ground for this and the earlier issue is that in both cases we have an interpretation unfavourable to the seafarers, an interpretation that is almost impossible to arrive at by target or teleological interpretation.

4. AN OVERVIEW OF (SOME) KEY ISSUES

In our opinion, the key problem of seafarers in general, including when health and pension insurance are concerned, are the actions of the government in the widest sense of that term (including everyone from the legislator to the lowest clerk in the often long administrative and bureaucratic chain), which are in many situations contrary to the principles of legal safety and the rule of law. Probably the best example of this practice are the so called accelerated years of pensionable service for seafarers which were never abolished, at least not in the only way that acts can be put out of force⁽⁴⁾ - the same way the legal provision was adopted. Although the seafarers have never been formally divested of this right, in practice thousands of seafarers are deprived on a daily basis. Although this issue has been resolved pro futuro, the preceding period is plagued by a factual state that could serve as a basis for thousands of civil suits against the Republic of Croatia, either for the recovery of the overpaid amounts, or because a certain number of years will not be counted as the accelerated years of pensionable service. The pension bonus is currently a burning issue (by no means a negligible percentage, up to as much as 27%), as is the question of the age of retirement which could more than logically be resolved by lowering their age limit in comparison with the general age limit proportionate to the so called accelerated years of pensionable service (12 years counted as 15).

5. PROPOSALS DE LEGE FERENDA

As stated earlier, significant modifications of the legal framework for any issue, including the problems of seafarers, can be achieved by means of the interpretation process. However, if the criteria of legal safety, rule of law and speed (if the legislator is fast⁽⁵⁾) are applied, the legislator is definitely the first choice. What we primarily have in mind is a clear and unambiguous legal text, either a new act or amendment of an extant one, including the possible application of the constitutional option of lending certain parts a retroactive effect. Apart from this type of activity of the legislator, there is also the possibility of the so called credible interpretation, in which case there is an aggravating circumstance that such interpretation always has a retroactive

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⁴ Also exception in the case of annulment by the Constitutional Court of the Republic of Croatia.

⁵ In essence the issue of possible speed is not contentious, since most of the acts are adopted by emergency procedure – the real issue is how to convince the decision makers that the problem actually exists and how to resolve it in the best possible way.

effect, which is in principle considered bad for legal safety and rule of law.

Although this is by no means a closed list of proposals, considering the topic of this paper, we would primarily suggest that the legislator amend the Maritime Code with a provision that the current solution for the issue of accelerated years of pensionable service for all seafarers be lent a retroactive effect, and that the limitations from the Bonus Act not be applicable to seafarers. It would be useful, since the term seafarer is used in legal and sublegal acts⁽⁶⁾, to introduce the legal definition of the seafarer, clearly distinguishing this term from the concept of the crew member.

6. CONCLUSION

Understanding all the imputations and attempts to make a difficult situation even worse when it comes to seafarers and their rights is difficult to comprehend. We could list the arguments in favorem of the seafarers and their rights indefinitely, one was already provided in this paper, but we feel that there is no better argument than the fact that both in Croatia and abroad there is a saying that the seafarers have a bread with seven crusts. If we apply this saying to the rules of interpretation, primarily target or teleological one, it seems that all the issues we have been dealing with in this paper, as well as numerous others, have root in someone's arbitrary will, without any foundation in the Constitution and law. If that was really the case, now is the time to make some changes and do everything to restore to the seafarers, who are not merely one of the small number of globally recognized and acknowledged Croatian brands (apart from e.g. sport and tourism), but deserve wholehearted support⁽⁷⁾, their well-deserved status and rights. In so doing, in the long run, we should not fear the admission of illegal actions from the past and the rightful compensation of seafarers for the damage inflicted on them for years.

6 The Croatian legislator frequently uses the term seafarer, although sometimes (without any clear criterion) alternating the terms "seafarer" and 2crew member". This practice is also discernible in some sublegal acts, so that the term "seafarer" is used in their very titles, like e.g. the Ordinance on vocations and certificates of competencies for *seafarers* (OG 50/07, 62/09, 73/09, 15/10, 142/10, 64/11), Ordinance on Seafarer's Books and Embarkation Permits, Procedures and Mode of Registration and Deregistration of Seafarers in the Compulsory Pension Insurance Scheme and the Compulsory Health Insurance Scheme (OG 3/08), Ordinance on Mediation in Employment of Seafarers (OG 120/07).

7 If they sail with foreign companies, this can be considered a kind of an export, if on Croatian ships, their expertise contributes to the safety of passenger and freight transportation, which is obviously a critical issue in the world today (let us remember the recent accident of the Costa Concordia cruiser), what would happen to our islands without seafarers, what to our shipyards ...

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Arrest of Ships – The International Conventions on Arrest of Ships

Jelena Nikčević Grdinić, Gordana Nikčević

This paper discusses the most important questions concerning the temporary arrest of seagoing ships through solutions given in the existing international conventions. Special attention is given to the changes contained in the International Convention on Arrest of Ships of 1999 that came into force on 14 September, 2011, compared to the previous Convention of 1952. The basic approach to the principle of temporary arrest of ships remained unchanged according to the Convention of 1999 compared to the 1952 Convention. Still, temporary arrest of ships can only be effected for maritime claims. Having in mind that the 1999 Convention increases the number of maritime claims in relation to the Convention of 1952, and in a way that certain maritime claims that were previously considered claims for purely business relationship, for which creditors had not been able to enjoy the protection relating to arrest of the ship, are deemed to be maritime claims. Changes were also made to the right of re-arrest and multiple arrest of the ship. Convention of 1999 does not greatly alter the existing international regulations as established by the previous Convention, but attempts to additionally specify certain solutions contained in both the Conventions, in terms of their improvement and modernization.

KEY WORDS

~ Arrest of ships

- ~ Ship
- ~ International Arrest Conventions

1. INTRODUCTION

Arrest of seagoing ships is an issue of considerable importance to the international shipping and trading community. While the interests of owners of ships and cargo lie in ensuring that legitimate trading is not interrupted by the unjustified arrest of a ship, the interest of claimants lies in being able to obtain security for their claims. Arres means the detention of a ship by judicial process to secure a maritime claim, but does not include the seizure of a ship in execution or satisfaction of a judgment. The main objective of the arrest is that the creditor who arrested the ship secures his claims. The final possibility, which stems from the seizure effected, consists of the right to sell the ship in the enforcement procedure.

So far, in the matter of arrest of seagoing ships two international conventions have been adopted. International Convention Relating to the Arrest of Sea-Going Ships of 1952 that came into force on 24 February 1956 and International Convention on Arrest of Ships of 1999 that came into force on 14 September 2011. So far, only 10 states have chosen to ratify this convention and these are Albania, Algeria, Benin, Bulgaria, Ecuador, Estonia, Latvia, Liberia, Spain and the Syrian Arab Republic. However, Denmark and Norway have signed up to the new Arrest Convention and so may choose to ratify it in the future. The 1999 Arrest Convention was designed to update and address the identified deficiencies of the 1952 Arrest Convention and aims to strike a fairer balance between the interests of the ship owner and claimant.

2. INTERNATIONAL CONVENTION FOR THE UNIFICATION OF CERTAIN RULES RELATING TO THE ARREST OF SEA-GOING SHIPS OF 1952

2.1. Determining the number and types of maritime liens

The basic starting principle is that ships may be only be arrested in respect of securing maritime claims. The Convention

University of Montenegro, Faculty of Maritime Studies, Dobrota 36, 85330 Kotor, Montenegro

e-mail: jelenag@ac.me



explicitly lists in its first Article which claims are considered maritime claims. Further, the Convention emphasizes that maritime claims are considered those ones arising out of one of the following causes:

- (a) damage caused by any ship either in collision or otherwise;
- (b) loss of life or personal injury caused by any ship or occurring in connexion with the operation of any ship;
- (c) salvage;
- (d) agreement relating to the use or hire of any ship whether by charterparty or otherwise;
- (e) agreement relating to the carriage of goods in any ship whether by charterparty or otherwise;
- (f) loss of or damage to goods including baggage carried in any ship;
- (g) general average;
- (h) bottomry;
- (i) towage;
- (j) pilotage;
- goods or materials wherever supplied to a ship for her operation or maintenance;
- construction, repair or equipment of any ship or dock charges and dues;
- (m) wages of Masters, Officers, or crew;
- Master's disbursements, including disbursements made by shippers, charterers or agent on behalf of a ship or her owner;
- (o) disputes as to the title to or ownership of any ship;
- (p) disputes between co-owners of any ship as to the ownership, possession, employment, or earnings of that ship;
- (q) the mortgage or hypothecation of any ship.

Even before the Convention came into force there was no dispute in legislation and court practice of certain maritime countries that the ships may only be arrested for maritime claims. However, when it is needed to determine what is considered a maritime claim, there are basically two approaches. One is that such claims are explicitly enumerated and that out of that enumeration there are no other claims, it is so-called closed list of maritime claims. Another approach is not to enumerate the claims, that is, in addition to possibly enumerated claims, courts can also recognize other claims as maritime ones. This approach is known as open-ended list of maritime claims.⁽¹⁾

Convention of 1952 provides a closed list and in respect of outstanding practice it should concluded that it is about maritime claims that were, as such, undisputed and acceptable to most countries.

2.2. Temporarily arrest of the ship as a method of securing maritime claims

Definition of the arrest of the ship, as stipulated in Article 1 of the Convention, is that "arrest" means the detention of a ship by judicial process to secure a maritime claim, but does not include the seizure of a ship in execution or satisfaction of a judgment. This type of arrest of the ship in the theory of the Continental Maritime Law is known as the conservative ship arrest, while arrest of the ship on the basis of an enforceable court decision is known as the court arrest.⁽²⁾

Temporarily arrest of the ship is solely related to maritime claims and can only be pronounced by the court. This does not affect any rights or powers vested in any government, that is any public authority, or in any dock or harbor authority, under any international convention or under any domestic laws or regulations, to detain or otherwise prevent from sailing any ship within their jurisdiction.

Arrest is the security measure that is stipulated in favor of a creditor of maritime claims and its basis represents a personal obligation of the debtor - the owner of the ship in question under certain conditions, and the charterer, or other person responsible for the claim against that ship, though is not its owner. This connection between the maritime claim and the entity responsible for its settlement is reflected in the legal possibility that the Convention provides to a creditor, that for the claim arose out against the ship of the debtor, the creditor may arrest any other ship owned by him, considered to be the ship of the same owner if all its parts belong to the same person.

The exception to this broadly established right to seize another ship belonging to the same owner is made in three cases: disputes as to the title to or ownership of any ship, joint ownership, possession and in relation to the rights of creditors under the mortgage or hypothecation of any ship. The creditor in such cases can solely arrest the ship against which the specific claim arose out.⁽³⁾

Possibility of arresting another ship belonging to the same owner, i.e. lessee or charterer, depending on who is personally liable for certain maritime claim, is known in legal theory as a "sister ship arrest." This right to seize another ship is recognized today in almost every state, but approach to the matter differs from state to state. Some states, such as, for example, the United Kingdom, allowed the possibility to seize another ship belonging

¹ Tetley states that the Great Britain applies the principle of closed, and Canada the principle of open-ended list of maritime claims. USA also belongs to states having an open-ended list, so it is stated that America belongs among countries with the largest circle of recognized maritime claims.

² M. Grigoli, Grigoli M., Diritto Della Navigazione, Torino, 1982.str. 495., P. Manca, The Italian Code of Navigation – translation and commentary, 1969, pages 308-314 (Articles of the Italian Code from Article 682 to 686).

³ This possibility is stipulated stipulated in Article 3, items 1-4 of the Convention, given that excluded claims from seizure of another ship belonging to the same owner are listed in items o, p and q Article 1, paragraph 1 of the 1952 Convention.

to the same owner after adoption of the 1952 Convention. The United Kingdom exercised this right by the Law of 1956, as the literature points out, to comply English law in this matter with continental law countries. The possibility to seize another ship belonging to the same owner was confirmed by the Supreme Court Act of 1981.⁽⁴⁾

Another issue that arises in connection with the "sister ship" clause is the issue of the identity of the ship owner. It may be, in fact, disputable whether in determining the identity only the owner specified on a ship's certificate of registry issued by an Administration (registered owner) is recognized, or the determination process goes further than that, and determines who the beneficial owner (French, véritable propriétaire) is. Most states allow determination of the beneficial owner and attach the rights of the "sister ship" clause to him.⁽⁵⁾

The Convention provides a way of proving the existence of a maritime claim and validity of a maritime claim, which would be reason enough to seize the ship. This solution was left to national legislation. According to our law and the laws of most other states, the court shall allow the arrest of the ship if the creditor makes his claim plausible. Additional liability, according to our law, is that a creditor has to justify the arrest effected by filing a lawsuit with the competent court not later than 15 days after permitted arrest of the ship.⁽⁶⁾

Arrest of the ship in accordance with the Convention and the legislation of the countries that accept the Convention is of a temporary character. The main objective of the arrest is that the creditor who arrested the ship secures his claims. The final possibility, which stems from the seizure effected, consists of the right to sell the ship in the enforcement procedure. However, the owner of the ship, or other person who uses the ship, may release the ship from the arrest effected, either by paying the debt or by providing an appropriate guarantee for creditors' claims.

Foreign ships cannot be arrested and seized for enforcement during an innocent passage through the territorial sea or internal waters, where an international or intergovernmental regime of navigation is in force. Also, foreign ships cannot be seized and the enforcement procedure cannot be subsequently exercised on them later, if they are retained in the internal waters and ports of our country due to force majeure or the navigation needs while such a need lasts. However, if the foreign ship passing through the territorial sea or internal waters causes a certain damage, for example, pollutes the sea or similar, or it is provided with salvage operations, and in the course of such a sailing a claim against the ship arises due to which normally a seizure can be effected and an enforcement procedure exercised, this ship will be arrested and an appropriate further action will be taken against it.⁽⁷⁾

Regarding security, i.e. collateral, which may be given for the release of the ship, in practice this is a security such as a deposit in cash, bank guarantee or a guarantee of R & I clubs provided that, in addition to the release of the ship, a creditor will be paid the amount which is awarded by the final judgment of the competent court.

A dispute often arises about what nature and the amount of security is sufficient for the court to release the ship and allow the journey to be continued. In accordance with Article 5, paragraph 2 of the Convention, in the absence of agreement between the parties as to, the sufficiency and form of the security, the Court shall have jurisdiction to determine its nature and the amount thereof.

The Convention pays particular attention to jurisdiction for the arrest effected and establishes that the court shall be competent if it is competent also according to its internal law for such an arrest. The court shall have jurisdiction, according to the Convention, if the claimant of the arrest has habitual residence or principal place of business in the State where the arrest has been effected; further, if a maritime claim arose out in the state where the arrest is effected; if a maritime claim arose out during journey in the course of which the arrest has been effected; if a claim arose out of the collision of vessels on the sea due to salvage operations; or if the claim is secured by a maritime hipoteque or mortgage on the arrested ship.

However, the process of arrest due to later litigation procedure is not null and void. The arrest remains in force, and the court determines the period in which the claimant must initiate a proceeding before the competent court or tribunal, and depending on the provisions of the contract of carriage and other circumstances. If the dispute is not initiated in due course, the person whose ship has been arrested may require suspension of a detention and return of the security. Of course, the right according to the Convention applies to states that have ratified the Convention and allow for a possibility that one of the states that have acceded to the Convention denies the right of arrest to claimants who come from states which have not ratified the Convention.

Finally, the Convention stipulates that a request to release the ship and offering of the security according to such a request does not imply recognition of responsibility in relation to maritime claim for which the ship has been arrested.



⁴ See: F.N. Hopkins, Business and Law for the Shipmaster, Glasgow, 1966, p.60, as well as Article 21 (B item 4 of the Supreme Court Act of 1981).

⁵ Those states are: Great Britain, France and Canada, whila USA recognizes solely a registered owner.

⁶ Article 1025, paragraph 2 of the Law on Maritime and Inland Navigation ("Official Gazette of the Federal Republic of Yugoslavia", Nos. 12/98, 44/99, 74/99 and 73/00).

⁷ Article 908, paragraph, items 2 and 3 of the Law on Maritime and Inland Navigation .

In the world naval practice the arrest of the ship is a procedure in which maritime claims may be enforced by a proceeding in rem through forced sale of the ship as the well known institute in common law countries. Therefore, it is one a necessary international legal instrument, through which, in the event that claims are not settled, the forced sale of the ship is provided. This is the advantage that this international Convention provides to the creditors of maritime claims. On the other hand, it protects the debtor, ship owner, lessee (charterer) or other person responsible for the claim against the ship in such a way as to enumerate in Article1, item 1 the maritime claims, thus limiting the right to seize for other types of claims.

3. INTERNATIONAL CONVENTION OF 1999

When the IMO, UNCTAD and the CMI initiated proceeding for adoption of the new International Convention on Maritime Liens and Mortgages, the work on preparation of the Convention on the Arrest of Ships was also initiated. This resulted in the adoption of new Convention of 1999. The 1999 Arrest Convention came into force on 2011, having finally been ratified by the requisite ten countries. That this process took over 12 years reflects the lukewarm reception that the Convention has received from the international shipping community.⁽⁸⁾

The new Convention from 1999 also does not greatly alter the existing international regime as established by previous Convention, but seeks to codify the whole matter, leaving less space to Contracting States for "their own solutions." However, as regards enforcement of the arrest procedure, it is still left to national legislation by application of the principle lex fori.

The basic approach to the principle of temporary arrest of ships remained unchanged according to the Convention of 1999 compared to the 1952 Convention. Still, temporary arrest of ships can only be effected for maritime claims. Having in mind that the 1999 Convention increases the number of maritime claims in relation to the Convention of 1952, and in a way that certain maritime claims that were previously considered claims for purely business relationship, for which creditors had not been able to enjoy the protection relating to arrest of the ship, are deemed to be maritime claims. Namely, while in the 1952 Convention all claims, which are considered maritime, are classified in 17 groups from a to q, maritime claims in the 1999 Convention are contained in 22 groups starting from a and ending with v.

In accordance with Article 1 of the Convention "Maritime claim" means a claim arising out of one or more of the following: loss or damage caused by the operation of the ship; loss of life or personal injury occurring, whether on land or on water, in direct connection with the operation of the ship;salvage operations or any salvage agreement, including, if applicable, special compensation relating to salvage operations in respect of a ship which by itself or its cargo threatened damage to the environment; damage or threat of damage caused by the ship to the environment, coastline or related interests; measures taken to prevent, minimize or remove such damage; compensation for such damage; costs of reasonable measures of reinstatement of the environment actually undertaken or to be undertaken; loss incurred or likely to be incurred by third parties in connection with such damage, and damage, costs or loss of a similar nature to those identified in this subparagraph (d); costs or expenses relating to the raising, removal, recovery, destruction or the rendering harmless of a ship which is sunk, wrecked, stranded or abandoned, including anything that is or has been on board such ship, and costs or expenses relating to the preservation of an abandoned ship and maintenance of its crew; any agreement relating to the use or hire of the ship, whether contained in a charter party or otherwise; any agreement relating to the carriage of goods or passengers on board the ship, whether contained in a charter party or otherwise; (h) loss of or damage to or in connection with goods (including luggage) carried on board the ship; (i) general average; (j) towage; (k) pilotage; (1) goods, materials, provisions, bunkers, equipment (including containers) supplied or services rendered to the ship for its operation, management, preservation or maintenance; (m) construction, reconstruction, repair, converting or equipping of the ship; (n) port, canal, dock, harbour and other waterway dues and charges; (o) wages and other sums due to the master, officers and other members of the ship's complement in respect of their employment on the ship; including costs of repatriation and social insurance contributions payable on their behalf; (p) disbursements incurred on behalf of the ship or its owners; (q) insurance premiums (including mutual insurance calls) in respect of the ship, payable by or on behalf of the shipowner or demise charterer; (r) any commissions, brokerages or agency fees payable in respect of the ship by or on behalf of the shipowner or demise charterer; (s) any dispute as to ownership or possession of the ship; (t) any dispute between co-owners of the ship as to the employment or earnings of the ship; (u) a mortgage or a "hypotheque" or a charge of the same nature on the ship; (v) any dispute arising out of a contract for the sale of the ship.

In relation to the 1952 Convention the claim from bottomory was the only one omitted, and the following claims were added: claims for indemnification or other compensations in connection with elimination of perils or preventive actions, claims in connection with pollution of the marine environment or similar actions regardless of whether they arose in relation to international conventions or any other regulations or

⁸ Article 14 of the 1999 Arrest Convention provides that it will enter into force six months after it has been ratified by 10 States. Albania became the tenth State to ratify the Convention on 14 March 2011.The States which have agreed to be bound by the Convention are Albania, Algeria, Benin, Bulgaria, Ecuador, Estonia, Latvia, Liberia, Spain and the Syrian Arab Republic.

agreements. This obviously introduced compensation and rewards for prevention and elimination of damages caused by pollution of the marine environment as maritime claims.

Likewise, maritime claims are considered the costs associated with the lifting, removal or destruction of the remains of the ship and cargo, which was not foreseen by the Convention of 1952. The Convention, following solutions of the 1993 International Convention on Maritime Liens and Mortgages, supplements the rights of seamen for protected maritime claims, considering the right for costs of repatriation and social insurance contributions payable on their behalf as maritime claims.

Likewise, as already mentioned, maritime claims are considered port, canal, dock, harbor and other waterway dues and charges, as well as claims from insurance premiums including mutual insurance calls (contribution to P&I clubs), and agency fees in respect of the ship, payable by or on behalf of the shipowner or demise charterer.

In the first comments that appeared after the adoption of the Convention of 1999, it was considered that in relation to the application of sister ship clause on arrest of another ship belonging to the same owner, the Convention narrows that right in a way that only another ship of a registered owner and not of beneficial owner may be seized, as so far has been the case in the current practice in most states. Such a solution of the new Convention has already been criticized in the literature.⁽⁹⁾ The conclusion reached by Tetley in the quoted article is only possible based on intentions of participating countries at the conference where the Convention was adopted, to narrow the existing approach to the sister ship clause. But, in respect of grammatical interpretation of the new text of the Convention, we deem that there is no basis for the conclusion that the Convention changes the existing approach. The attitude of the case law, and after the entry into force of the Convention, should show whether in this respect changes in basic approach to this matter occurred. We think that still nothing prevents the courts to allow for determination of the real ownership of the ship, and that all ships belonging to the beneficial owner may be seized for collection of maritime claims.(10)

In relation to the extensions made, a classification of owed insurance premiums and agency fees among maritime claims should be certainly considered the great innovation, because up to now there has been an attitude, both in theory and in the case law, that it is about purely commercial claims, which cannot be settled by the possible seizure of the ship. Likewise, disputes under ship purchase and sale agreement, until adoption of the 1999 Convention, were considered to be purely economiccommercial disputes, and eventually such a claim could not be obtained by the seizure.

Extensions which the Convention accepts take the output of the Convention go out to meet, on one hand, the new international regulations in the field of protection of the sea and the marine environment, and on the other the case law of many states that have already recognized port, canal, dock, harbor and other waterway dues and charges as maritime claims.

Unlike the 1952 Convention, the 1999 Arrest Convention allows claimants multiple opportunities to secure their claims. Under Article 5, a claimant can re-arrest a ship after it has been released, and has the option of arresting multiple ships, in order to top up the security for his claim. The right to re-arrest or to arrest multiple vessels arises only when:

- the security already provided is inadequate (in the case of re-arrests, the security can never exceed the value of the vessel in question);
- or the person who provides the security is not, or is unlikely to be able to, fulfill its obligations;
- or the ship or the original security was released either with the consent of the claimant acting on reasonable grounds
- or because he could not by taking reasonable steps prevent the release.

It is certain that the proposed solutions in the Convention go out to meet the commercial participants and intermediaries in maritime navigation, such as insurers, agents, banks, and especially banks providing loans for shipbuilding and sale of ships. In its remaining part, the Convention just further specifies the solutions adopted also by the Convention of 1952.

The Convention stipulates the possibility in cases if arrest of the ship having been wrongful or unjustified, or where excessive security having been demanded and provided by the a creditor of the arrest, that the courts may impose upon the claimant who seeks to arrest or who has procured the arrest of the ship the obligation to provide security of a kind and for an amount, and upon such terms, as may be determined by that Court for any loss which may be incurred by the defendant as a result of the arrest. This solution is in accordance with the existing case law in many states. In the South African Republic, courts, almost without exceptions, require that the creditor, which requires arrest of the ship, has to deposit the security determined by the court in order to allow the arrest.

Both Conventions provide for prohibition of rearrest, i.e. multiple seizures of the same ship or another ships belonging to the same owner in the territory of states that have ratified the Conventions and apply the same. Arrest of the ship shall

⁹ W. Tetley, Arrest, Attachment and Related Maritime Law Procedures (1999), 73 Tulane Law Review 1895-1985, points to a diference between 1952 Convention and the same Article of 1999 Convention, consisting of wordings "owned by" in the original text, and wordings "owner of the ship" in the text of 1999.

¹⁰ As the Convention relatively recently came into force, it cannot be determined with certainty whether the case law in all states will follow formal legal opinion on ownership of the ship, or will, as so far has been done, allow the probate proceeding of real ownership of a certain ship in each individual case.

be determined by application of the law of the state where the arrest was effected. The condition for arrest in the procedure law context is that the ship whose arrest is sought is within the jurisdiction of the state concerned and the particular court. In this matter, it is irrelevant whether or not cargo or passengers are on the ship, and whether or not the ship is ready to sail. The arrest may be imposed until the last moment while the ship, for which the arrest was sought, is within a jurisdiction of maritime and legal authorities of the state where the arrest is sought. However, the ship that is passing through the territorial sea and other waters may not be arrested. The basis for arrest possibility is harbor entrance.

It has been said that the question of jurisdiction to decide on arrest of the ship is not related to the issue of actual judicial or arbitral jurisdiction for judging in the dispute for the claim for which arrest is sought. In that part there are certain differences between the 1952 Convention and the 1999 Convention. The 1952 Convention, in Article 7, explicitly enumerates cases where the court of the state in which the arrest is effected shall have jurisdiction to determine the case upon its merits. (11) If the court which imposed the arrest is not competent for judging of the dispute in question, the court will accept agreement of the parties to submit the dispute to a court of another state which accepts jurisdiction, or to arbitration, or will, in the absence of such agreement, determine the period within which the claimant should initiate proceeding before the competent court or arbitration and thus condition the validity of the arrest, i.e. deposited security. 1999 Convention goes further than this solution, and the court of the state that allowed the arrest, is declared competent to accept the trial for a dispute due to which the arrest was effected. However, this provision does not prejudice the right of parties to entrust their dispute to the court or arbitration of another state, or to the local court of the state, even if the court declared itself incompetent in accordance with the norms of domestic law. If there is no valid agreement the court will accept the dispute or give a specific deadline to litigants, i.e. the claimant, to initiate proceeding before the competent court or arbitration tribunal, and all with the legal consequences as it is standardized under the 1952 Convention.

4. CONCLUSION

Our country ratified the 1952 Convention. During ratification, it used the right to enter a reservation not to apply the provisions of the Convention, but its own right when it comes to disputes about ownership of the ship. It was then understandable considering the so-called state (public) ownership of ships in that period. However, that reason is not valid any more. In the remaining part, the Convention was ratified without reservations, which included its implementation as a whole, with no additional changes or modifications. The right to arrest the ship is incorporated in our law and is still in the Law on Maritime and Inland Navigation, which represents a positive piece of legislation in Montenegro. Although Montenegro, following its independence, started creating a new maritime legal framework in a way that certain areas of the Law on Maritime and Inland Navigation are to be separated and regulated by special laws, a new legislation in this matter has not been adopted yet. In addition, we believe that, although Montenegro has not ratified the 1999 Convention, it would be useful to take into account and to accept a solution which that Convention provides as the protection of ship owners from excessive claims of creditors during the arrest of ships.

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¹¹ The Courts of the country in which the arrest was made shall have jurisdiction to determine the case upon its merits if the domestic law of the country in which the arrest is made gives jurisdiction to such Courts, or in any of the following cases namely: (a) if the claimant has his habitual residence or principal place of business in the country in which the arrest was made; (b) if the claim arose in the country in which the arrest was made; (c) if the claim concerns the voyage of the ship during which the arrest was made; (d) if the claim arose out of a collision or in circumstances covered by article 13 of the International Convention for the unification of certain rules of law with respect to collisions between vessels, signed at Brussels on 23rd September 1910; (e) if the claim is for salvage; (f) if the claim is upon a mortgage or hypothecation of the ship arrested.

Quantitative and Qualitative Basis of Customer Relationship Management Concept Development in the Adriatic Ports

Senka Šekularac-Ivošević, Sanja Bauk

Quantitative-qualitative analyses of the marketing aspects of operation of the ports of Bar, Ploče and Rijeka as extremely competitively positioned on the common target market are considered in this paper. Therefore, market investigations have been carried out and users' preferences have been established, an overview of the conditions has been made on the basis of which the actual positions of ports have been determined and represented by perception maps, while on the basis of Markov model a forecast has been made for consumer commitment in the following three time intervals, each of them one year long. The numerical results gained, as well as comments in the marketing sense, should contribute to creating a base of knowledge about target users, so as to support the development of CRM (Customer Relationship Management) concept in the ports analysed.

KEY WORDS

- ~ Marketing of maritime ports
- ~ Quantitative-qualitative analysis
- ~ Markov model
- ~ CRM concept

e-mail: senkas@ac.me, bsanjaster@gmail.com

1. INTRODUCTION

Assessment of market potential and predicting future conditions of a certain business system represents one of the basic tasks in market research. For maritime ports investigating goods flows in the logistic chain and economic forces of the hinterland is highly significant, as it provides information on the size of the market, i.e. individual market segments.

In forecasting a future position (market participation rate) of a port on the market, from a general aspect, qualitative, quantitative and combined qualitative-quantitative methods are applied.

Qualitative or the so-called non-quantitative methods primarily rely on the psychological characteristics of the respondents such as opinions, attitudes, values, expectations, feelings, perceptions and alike. Experts, most commonly from the management structure, on the basis of their own assessment supported by the experienced acquired, forecast the future development of a port. From this group of methods (Bush et al., 1998), the following methods are singled out: assessment method (Delphi method) and counting method (inspecting users' purchase intentions, test marketing, etc). The application of qualitative methods is most effective when they are used for short-term forecasts, in cases when there are no available data from the past, in shortage of time and capacities for the application of quantitative methods, i.e. when they are used as a basis for the application of the others (Hess, 2004).

Quantitative methods, according to Kotler, are included in the third forecasting method, i.e. the method of *what people have done*. Namely, already in the early 1990s Kotler made a



University of Montenegro, Faculty of Maritime Studies, Dobrota 36, 85 330 Kotor, Montenegro

division into marketing forecasting methods such as (Ivanković, 2000): *what people say* (investigating buyers' intentions, sellers' opinions, experts' opinions), *what people do* (testing products on the market), and *what people have done* (mathematical and statistical analysis based on the report about past sale – analysis of traditional time series and statistical analysis of demand). These kinds of analyses are based on numerous deterministic and stochastic methods (Bauk, 2010; Bauk, 2011; Hess, 2004). The basis for their application are data on the movement of a phenomenon and influencing factors from the past, while the support is represented by an intensive development of computers and programmes that effectively include into calculation a large number of data and generate optimum solutions.

Combining qualitative-quantitative methods represents a kind of fusion of theoretical explanations of state and movement on the market, here in the marketing sense of the term, and of well-known and structured quantitative methods.

2. BASICS OF CRM CONCEPT OF MODERN PORTS

The effectiveness of the entire operation of maritime ports depends to a high degree on qualitative marketing decisions. In an environment in which ports operate a there is a continuously increasing risk that makes appropriate business decision-making complex. Therefore, it is necessary for every port to have at disposal reliable information gained by the process of market research.

The process of market research takes place in seven consecutive steps: definition of the problem and aims of the research, determination of sources of information, development of sampling strategy, determination of methods and techniques of data collection, collection of data, their processing and analysis, and reporting the results to decision-makers (Hanić, 2003). By the process of market research the necessary information on the subjects on the market are provided, primarily on users, on the programme of marketing fusion, on marketing politics and strategies, etc.

When loyalty of port users is analysed, it is important to take into consideration the degree of user satisfaction, i.e. whether user expectations have been exceeded, whether the user is planning to continue business cooperation, and how ready he is to pay for the services, and alike. It is often the case that the user gives up at the moment when a better possibility occurs with competition. This means that although a port has a lower rate, low-quality service de-motivates the user to continue business cooperation. A small number of users are ready to submit appeals for services, which decreases the possibility of discovering reasons of user giving up using port services. Therefore, in this business it is very important to have knowledge about users, and this is best achieved if feedback information on user satisfaction is available. For this purpose, the management and employees should develop a system of port user complaint management (Lovelock et al., 2004), so that a new service of transhipment, stowage, or added value can improve user satisfaction.

Although modern technologies have changed business conditions on the maritime market, among shipping companies traditionalism is still cherished, and respectability, a positive image that a port has is appreciated. Until recently in the literature considering user satisfaction and loyalty, but also in practice, the marketing was focused on attracting new users in such a way as to offer flexible prices, special offers and very aggressive promotion (Berry, 1995). However, nowadays at the level of strategic management efforts are made in user retention, concentration on achieving higher rates with users than market participation, establishment and maintenance of long-term relationships with users and collecting as much information about them as possible as input for top-quality marketing decision-making (Đukić, 2000). By taking the central position in a port system, a service user has practically determined the direction of the management towards meeting hisown requirements, as well as towards building up and fostering their mutual relationships.

Modern ports in their operation recognise and accept techniques and knowledge from the area of relationship marketing (RM - Relationship Marketing) and customer relationship management (CRM - Customer Relationship *Management*). In the very definition of marketing the emphasis is on relationship marketing as marketing represents an organisational function and a set of processes for creating, communication and delivery of values to the user, as well as management of relationships with users so as to achieve benefit for the organisation and its stakeholders (Harker et al., 2006). Marketing of port-users relationship is focused on the value that is delivered, not on the port service attributes. Its end result are not unidirectional transactions between users and the port, but creating common assets of customers, the so-called network marketing that basically has a database on the existing and potential users (Gligorijević, 2007).

3. INVESTIGATION OF USER PREFERENCES AND DETERMINATION OF ACTUAL POSITION OF PORTS ON THE MARKET

For port management nowadays there are numerous marketing challenges, among which the market research process management is primary. This process includes collecting information on the existing and potential users, economic, technological, social and political development, changes in trade and logistics, regulatory frame and its implications for port management, development of competitive ports and other stakeholders, etc. All the investigations mentioned above aim at solving the dilemma: why is a certain port preferred to its alternatives?

Modern marketing aspects of port operation include finding effective ways of strengthening the positions on the market, developing strategies of retention and increase of market participation, market segmentation and selection of target markets (segments), differentiating offer and positioning. Besides, marketing as a concept of maritime port operation but also practice, offers solutions for measuring buyer satisfaction, and especially for strategic attraction and retention of loyal clients who are profitable. Also, it is necessary to more intensively apply the spectrum of all marketing strategies in the domain of port operation, but also a wider overview of the significance of port service offer instruments (7P-service product, tariffs, distribution channels, integrated marketing communications, service processes, physical evidence, people). Marketing approach to port management is based on knowledge about user needs, where the focus moves from the internal performances of port operation, what the capacity is, towards market, what user preferences are.

Generally, positioning of ports analysed in this paper should enable clear determination of place in the minds of the users, which is determined in the way in which users see the offer of an actual port in comparison with a competitive one (Gligorijević, 2009). The position that is being built up is actually a place that organisations (ports) are trying to take in the mental map of users (Gligorijević, 2011).

3.1. Methodology

In this paper two sets of criteria are analysed: quantitative (7) and qualitative (26) that are shown in Tables 1 and 2. These two sets of criteria are further divided into several sub-sets (Bauk 2010; Pardali et al., 2008; Šekularac-Ivošević et al., 2012). Namely,

to the Adriatic container ports mentioned above (Bar, Ploče and Rijeka) the following methodology has been applied with the aim of their appropriate positioning:

- First, quantitative and qualitative criteria are identified;
- Then, a focus group is formed consisting of experts, researchers and users who are asked to assess the importance of each criterion, each of them according to his/her own feeling, with a numerical value on a scale from 1 to 10;
- After the marks of all the testees have been collected, their mean values are determined by all parameters, for each of the ports analysed;
- These mean values are later used as weight coefficients that are pondered, i.e. multiplied by the original values of the criteria discussed;
- Individual results gained by multiplying the original value of each criterion with the appropriate weight coefficient are then summed up for each of the three ports analysed;
- Finally, the results gained for quantitative and qualitative criteria, as well as their sum, have been used for positioning of the ports investigated and their representation by appropriate perception maps.

Mathematical formulation of the methodology described above is given below.

In the first step each of the criteria analysed has been assigned an appropriate variable: v_{Ai} - for quantitative criteria $(i = \overline{1,7})$, and v_{Bj} - for qualitative criteria $(j = \overline{1,26})$. Values of the variables v_{Ai} are, in fact, exact numerical values that correspond to the quantitative criteria for each of the three ports analysed (Table 1). The values of the variables v_{Bj} are binary (0,1) values

	Features		Sub factures	Ports		
			Sub-features	Bar	Ploče	Rijeka
eria	A1. Features of container terminal	A1.1	Number of berths (number)	2.00	1.00	2.00
crite		A1.2	Entire length of the berth (m)	330.00	280.00	450.00
ative		A1.3	Maximum depth of the local sea area (m)	14.00	13.80	12.00
ntita		A1.4	Container terminal capacity at a moment (TEU)	1760.00	1400.00	6500.00
. Qui		A1.5	Number of gantry cranes (No.)	1.00	1.00	3.00
A	A2. Total cargo	A2.1	Total cargo throughput (t)	2407.40	4532.80	4611.70
	throughput and human potentials	A2.2	Daily operations (hours)	24.00	24.00	24.00

Table 1. Quantitative criteria (A).



(Table 2). Thus, if the port analysed has a certain qualitative characteristic (criterion), then the variable v_{Bj} will have value one (1), and the opposite, if the port analysed does not have a certain qualitative characteristic, the value of the relative variable will be zero (0) (Pardali et al., 2008).

The values of the variables according to all singularly taken quantitative criteria are here divided with the maximum value among them, in case of each port discussed, in order to *mitigate* the differences in individual numerical values. Therefore, the variables: v_{Ai} ($i = \overline{1,7}$), are replaced by new variables:

$$\overline{\mathbf{v}_{A_i}} = \mathbf{v}_{A_i} / MAX\left(\left\{\mathbf{v}_{A_i}, i = \overline{\mathbf{1}, \mathbf{7}}\right\}\right).$$

The intention is, in fact, that all the values of quantitative criteria are reduced to the interval from 0 to 1 ($0 \le \overline{v_{A_i}} \le 1$). Furthermore, the respondents forming the focus group: experts (5), researchers (5) and users (10), have assessed the importance of each of the criteria mentioned above with marks from 1 to 10. Then, mean values of their marks have been determined according to all the parameters analysed, for each of the three ports observed. These values have served, then, as weight

	_ .			Ports		
	Features		Sub-features	Bar	Ploče	Rijeka
	B1. Infra- and super- structural features	B1.1	General cargo terminal	1	1	1
		B1.2	Dry bulk cargo terminal	1	1	1
		B1.3	1.3 Liquid cargo terminal		1	1
		B1.4	Ro-Ro terminal	1	1	1
		B1.5	Passenger terminal	1	1	1
		B2.1	Railroad connection		1	1
		B2.2	Road connection	1	1	1
	B2. Connections with hinterland	B2.3	Pipelines connections	0	0	1
8		B2.4	Barge service	0	0	0
,		B2.5	Shuttle service	0	0	0
5	B3. Marketing features	B3.1	Free zone	1	1	1
מרו אי		B3.2	Added value logistic services	1	0	1
allte		B3.3	Distribution centres	1	0	1
B. Qui		B3.4	Quality management system	1	0	1
		B3.5	Integrated marketing communications	0	0	0
	B4. Management models in ports	B4.1	Service port model	0	0	0
		B4.2	Tool port model	0	0	0
		B4.3	Landlord port model	1	1	1
-		B4.4	Private port model	0	0	0
	B5. Services to ship and cargo	B5.1	Ship monitoring	1	0	1
		B5.2	Ship repair	0	0	1
		B5.3	Ship chandler	1	0	1
		B5.4	Container control	1	1	1
		B5.5	Container leasing	0	0	0
	B6. ICT applications	B6.1	EDI service	1	1	1
		B6.2	VTS service	0	0	0

Table 2. Quantitative criteria (B).

coefficients: w_{Ai} - for quantitative criteria ($i = \overline{1,7}$), and w_{Bj} - for qualitative criteria ($j = \overline{1,26}$). Finally, the results summed up for quantitative and qualitative criteria are determined according to the following simple, mathematical formulae (1) and (2), for each individual port:

$$SA_{k} = \sum_{i=1}^{7} W_{A_{i}} \cdot \overline{V_{A_{i}}}, k = \overline{1,3}$$

$$\tag{1}$$

$$SB_{k} = \sum_{j=1}^{26} W_{B_{j}} \cdot V_{B_{j}}, k = \overline{1,3}$$
 (2)

where,

- SA_k the total result for quantitative criteria for k port;
- SB_k the total result for qualitative criteria for k port;
- *w_{Ai}* weight coefficient for i quantitative criterion from the set
 A criteria;
- v_{Ai} variable whose value is gained by dividing (original) value of the i criterion from the set A, with the maximum numerical value of that criterion for each of the ports analysed;
- w_{Bj} weight coefficient for j qualitative criterion from the set B criteria;
- $v_{\scriptscriptstyle Bi}~$ binary value of j qualitative criterion;
- k number of ports analysed, i.e. k = 3.

For calculation of (1) and (2) two *embedded* Excel functions of SUMPRODUCT type (array_1; \$array_2) were used: one for the quantitative criteria (i.e. for the set A) and the other for qualitative criteria (i.e. for the set B). In both cases «array_1» corresponds to the variable values of the criteria, while «\$array_2» corresponds to the fixed values of weight coefficients.

3.2. Numerical results

On the basis of calculations (1) and (2), perception maps for quantitative and qualitative analyses of the ports discussed were created, aiming at their mutual positioning and doing appropriate analyses on the market of port services. For this purpose matrices of weight coefficients were used, gained through interviews, and included below:

a) for quantitative criteria

$$w_{Ai} = \begin{bmatrix} A1: 7.88 & 8.17 & 8.61 & 8.83 & 8.28 \\ A2: 8.04 & 8.11 \end{bmatrix};$$

and

b) for qualitative criteria

B1:	7.95	7.73	7.15	7.83	7.36	
B2:	9.41	9.22	8.22	7.68	7.23	
B3:	7.88	7.89	8.34	8.31	8.34	
B4:	7.04	6.73	7.43	7.61		•
B5:	8.14	8.20	8.36	8.86	8.11	
B6:	8.51	8.41				
	B1: B2: B3: B4: B5: B6:	B1: 7.95 B2: 9.41 B3: 7.88 B4: 7.04 B5: 8.14 B6: 8.51	B1: 7.95 7.73 B2: 9.41 9.22 B3: 7.88 7.89 B4: 7.04 6.73 B5: 8.14 8.20 B6: 8.51 8.41	B1: 7.95 7.73 7.15 B2: 9.41 9.22 8.22 B3: 7.88 7.89 8.34 B4: 7.04 6.73 7.43 B5: 8.14 8.20 8.36 B6: 8.51 8.41	B1: 7.95 7.73 7.15 7.83 B2: 9.41 9.22 8.22 7.68 B3: 7.88 7.89 8.34 8.31 B4: 7.04 6.73 7.43 7.61 B5: 8.14 8.20 8.36 8.86 B6: 8.51 8.41	B1: 7.95 7.73 7.15 7.83 7.36 B2: 9.41 9.22 8.22 7.68 7.23 B3: 7.88 7.89 8.34 8.31 8.34 B4: 7.04 6.73 7.43 7.61 B5: 8.14 8.20 8.36 8.86 8.11 B6: 8.51 8.41 9.20 9.36 9.41 9.23

It should be emphasized that determining weight coefficients through interviews requires from the respondents to be expert, and to have a highly developed ability of logical reasoning, so that the assessment of even only one highly qualified expert (or, 20 professionals and long-time users, such as the case with this paper) is more significant than the assessment of a far larger number of less expert and experienced persons in this area (Sivilevičius et al., 2010). Using formulae (1) and (2), values of weight coefficients w_{Ai} and w_{Bj} , as well as Excel *embedded* function SUMPRODUCT (Šekularac-Ivošević et al., 2012), in the manner described in detail in the previous paragraph, perception maps represented in Figures 1 and 2 have been created.

First, two sub-sets of quantitative criteria are analysed: one that refers to the container terminal infrastructure and the other related to cargo handling and human resources in ports. On the basis of data that were gained through market research, we come to a conclusion that according to the first set of criteria the best positioned port is Rijeka, followed by the ports of Bar and Ploče. This is understandable with regard to their real infra and suprastructural equippedness, as well as economic development of the hinterland. According to the other analysed quantitative subset of criteria, the positions of ports are equal, in that the port of Ploče has a somewhat better position in relation to the port









Figure 2. Positions of ports determined on the basis of qualitative criteria (B).

of Bar, which results from a higher transhipment capacity of this port at a yearly level (Figure 1).

On the basis of actual positions of the ports considered (Figure 2), gained by previously done analyses of qualitative criteria, the following conclusion is reached:

- Ports of Bar, Ploče and Rijeka have equal positions regarding infra and supra- structural characteristics. This is collision with the results of the previously done quantitative analysis, as numerical analysis of qualitative criteria is pretty rough here, or random. Namely, here the question is raised if a port has (1), or does not have (0) a certain characteristic, but calculations are not done with any definite indicator, if subjective weight coefficients determined by the testees are excluded;
- When connections with the hinterland are considered, the ports of Rijeka and Bar, according to the results gained here, have fairly equal positions, while the port of Ploče, has in this sense a significantly worse position. However, here remains, similarly as in the previous case, an open question of the quality of connections with the hinterland and of economic power (development) of the hinterland;
- As regards marketing characteristics, the results gained point to equal positions of the ports of Rijeka and Bar, where the port of Ploče lags behind since it does not offer added value services, it does not have distribution centres, an established quality system (QMS) and integrated marketing communications;
- As regards the model of port management, the positions of the ports considered here are equal for the simple reason that they are all of the same *landlord port model*;

- As regards the range of services offered to ship and cargo, the port of Rijeka has advantage, the port of Bar is second, while the port of Ploče is at the lowest position because of all the services of the type it offers only the services of following the containers at the terminal;
- Finally, when ICT solutions are considered, all three ports are included in EDI system of document distribution so that in this regard they have equal positions. Regarding the introduction of VTSMIS, presently a lot is being done with IPA funds in the port of Bar (*Project:* "Vessel Traffic Management Information System (VTMIS) and response to marine pollution incidents", CRIS Number: 2011/023-173, 2011).

4. FORMING A MODEL OF FORECASTING USER COMMITMENT IN A FUTURE PERIOD

In marketing the Markov processes are used as a support to management, and most often for research and forecasting consumer behaviour regarding their loyalty. The demand for port services is a process that is distinguished by the basic Markov characteristic, i.e. the characteristic that the present state contains all the relevant information on the past and future states of port business systems (Mennis et al., 2008). In the investigations carried out so far the Markov stochastic processes have been considered in the sense of modelling mass servicing systems in maritime transport, as well as the application of the Markov theory to increase effectiveness of port operations (Mennis et al., 2008; Hess et al., 2009; Hess et al., 2011). Almost the majority of these works considers the technical-technological components of the port system, while special attention in this paper is paid to the prediction of future states of demand, based on homogeneous historical information on users who remained committed to the port, those who have appeared as new, as well as those who for some reasons stopped using the services of the ports investigated.

On the example of application of the Markov model in the assessment of the future positions of the ports regular shipping lines and cargo owners are analysed as target users on container terminals of the ports of Bar, Ploče and Rijeka. This is done for the reason that it is very complicated to gather information on the total number of users at the level of the port, because very few of them possess the majority of prerequisites for the development of CRM concept, i.e. they primarily do not possess systematized information on users in the way that the modern marketing information system requires.

4.1. Methodology

On the basis of previously determined positions of ports, as well as information collected by surveying and interviewing experts on approximate number of users on container terminals, the following procedure of calculating predictable market participation of the ports mentioned above is proposed (Backović et al., 2004):

- Observation of demand for port services on container terminals and recording changes in the number of users, which implies:
 - State at the beginning of the first time unit, i.e. the number of users of each port at the moment t,;
 - State at the beginning of the second time unit, i.e. the number of users of each port at the moment $t_{i_{u1}}$;
 - Movement of changes, transition of users from one to a second and third port and vice versa, in the period observed t_i – t_{i,1};
- (2) Calculation of the initial vector of state S₂;
- (3) Forming of square Markov matrix of transitional probabilities M based on the data from 1), where the condition that the sum of transitional probabilities in the matrix rows always equals 1 has to be satisfied;
- (4) Analysing the evolution of the market at the end of the three-year-long period through determination of new vectors of states S_1 , S_2 , S_3 , where the sum of state vector elements always has to be 1 (Backović et al., 2001); and
- (5) Graphic representation of the positions of ports in the period considered.

On the basis of the results of surveying data were gained that are systematised in Table 3. For the period from 2009 to 2011 the container terminal of the port of Rijeka has the highest total number of users. The container terminal of the port of Bar has more users than the terminal of the port of Ploče in the time intervals observed. These data are in line with the volume of transhipment on the container terminals of these ports, i.e. they completely match the positions on the perception maps that are shown in the process of their positioning.

In order to form a Markov matrix of transitional probabilities it is necessary to analyse the structure of user inflow and outflow,

Table 3. State of demand for port services in the period2009-2011.

State /Dorte		Ports			
State/Ports	Bar	Ploče	Rijeka	TOLAI.	
State in ti	8	5	17	30	
User outflow	2	2	0	4	
Remained committed	6	3	17	26	
User inflow	0	1	3	4	
State in ti+1	6	4	20	30	

as shown in Table 4.

According to the previously presented data, from the container terminal of the port of Bar there is a noticeable outflow of one user to the port of Rijeka and another one to the port of Ploče, while the port of Rijeka did not show any user outflow towards the other two ports. The port of Ploče had in the outflow structure 2 users who *transited* to the port of Rijeka. On the basis of data presented in the Tables 3 and 4, using the Markov concept, a model of forecasting consumer commitment in the sense of using the services of the ports analysed has been realised.

Table 4. Structure of user inflow and outflow in theperiod 2009-2011

Bar	Ploče	Rijeka	Total:
-	1	1	2
0	-	2	2
0	0	-	0
0	1	3	-
	Bar - 0 0 0	Bar Ploče - 1 0 - 0 0 0 1	Bar Ploče Rijeka - 1 1 0 - 2 0 0 - 0 1 3

4.2. Numerical results

On the basis of the data collected and the previously described Markov model of the prediction of future states, the following solution has thus been reached:

a) The initial vector of state, i.e.:

$$S_0 = \begin{bmatrix} \frac{6}{30} & \frac{20}{30} & \frac{4}{30} \end{bmatrix};$$

b) The Markov matrix of transitional probabilities:

	6	1	1	
	8	8	8	
м_	0	17	0	
vi —	17	17	17	'
	0	2	3	
	5	5	5	

- c) At the end of the first year, i.e. for t=1 it follows that: $S_1 = S_0 \cdot M = [0.150 \quad 0.745 \quad 0.105];$
- d) At the end of the second year, i.e. for t=2 it follows that: $S_2 = S_1 \cdot M = \begin{bmatrix} 0.1125 & 0.80575 & 0.08175 \end{bmatrix}$;
- e) At the end of the third year, i.e. for t=3 it follows that: $S_3 = S_2 \cdot M = [0.084375 \quad 0.852512 \quad 0.063113];$
- f) Graphic representation of port positions in the period considered is given in Figure 3.

The tendency that can be noted from Figure 3 goes in two divergent directions. It can be expected that the ports of Bar and Ploče in the forthcoming three-year-long period (2012-2014) will record, each of them, a mild decrease in the demand for services. On the other hand, a balanced increase in the demand will be characteristic of the port of Rijeka. In the marketing sense this can mean that all the ports considered possess a definite, constant number of users, and that the management of the ports of Bar and Ploče should be more focused on improving relationships with the users, while in the case of the port of Rijeka an increase in the number of new users can realistically be expected.

5. CONCLUSION

The ports of Bar, Ploče and Rijeka are complex business systems whose actual moment in the development is determined by numerous processes of organisational, proprietary, staff, technical-technological reforms. In this paper, the basic idea has been to offer a solution that can be helpful to port management in view of creating high-quality CRM concept on the basis of information on users. The starting point was the determination of basic steps of the positioning strategy, which resulted in creating overview perception maps. They picturesquely, regarding each quantitative and qualitative parameter of port operation, leave space for marketing interpretation. The development of the concept of long-term management of relationships to consumers is based on certain prerequisites such as: support and active participation of the port top management; availability of staff forming the project team for the introduction of this concept; technical-technological conditions; essential financial means, etc. However, this paper goes a step further in the sense that by using the Markov model, a prediction of service user commitment for these ports within the future three-year-long period has been made. What in future should be done to continue with the practice





proposed in this paper is to ensure as extensive precise numerical information on port qualitative performances as possible, as well as sensitive respondents estimation with a high degree of logical reasoning and expert knowledge.

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Analysis of Recent Supply and Demand of Educated Seafarers in Montenegro and Worldwide

Branislav Ćorović, Sanela Pejaković-Kovačević, Senka Šekularac - Ivošević

This paper illustrates the current state of creation of personnel in the maritime industry in Montenegro and worldwide. We are comparing many different systems of seafarer education around the world and indicating their benefits and shortcomings. We took into consideration BIMCO's research pertaining to the supply of and demand for seafarers on the international labor market. We also took into consideration the development of seafarers' careers in keeping with international conventions governing the systems of education and training of seafarers. This paper focuses on the current condition in seafarer education worldwide. We conducted a survey among 30 Montenegrin and 24 Croatian seafarers to establish their opinion on the educational system, seafarer employment agencies and careers.

KEY WORDS

- ~ Maritime affairs
- ~ Seafarers education,
- ~ Human Resource Managment
- ~ STCW

1. INTRODUCTION

Since human resources management is essential for business because ideas cannot be realized without competent, organized and well-trained employees (Ćorović, 2008), we all need seafarers trained and educated in line with international conventions. If we look back at the past couple of years, we will notice that the EU (European Union) has invested an enormous effort into the adoption of regulations governing the education and training of seafarers, which had a tremendous impact on the maritime industry. Today, quality seafarers cannot be created unless they are educated and trained in accordance with many conventions such as SOLAS (Safety of Life at Sea), STCW (Standards of Training and Certification and Watch keeping) and many others defining the education and training of seafarers in detail. The planning of the educational system is essential for all transitional countries needing to radically reform their educational systems to harmonize them with EU standards and Montenegro is one of such countries. For example, the EU demands knowledge-based life-long learning for seafarers. Montenegro is far from realizing this goal. We need to concentrate our efforts on the education of seafarers, because we are creating human resources that need to find a job on the international labor market. Following the international trends in seafarer education is essential.

2. SUPPLY OF AND DEMAND FOR SEAFARERS ON THE INTERNATIONAL LABOR MARKET

University of Montenegro, Faculty of Maritime Studies, Dobrota 36, 85330 Kotor, Montenegro

e-mail: corovic@t-com.me

BIMCO (Baltic International Maritime Council Organization) has done research pertaining to the supply of and demand for seafarers.



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Shortage of educated seafarers (senior officers) in 2010

Shortage of educated seafarers (senior officers) ten years ago



officers). Source: (BIMCO/ ISF, 2000).

According to research results, in 2000 there was a shortage of 16 000 officers which is approximately 4 % of the total officer pool. Predictions for 2010 show that there is a shortage of 46 000 officers. Research results indicate that there is a significant shortage of educated and well-trained senior officers on the labor market. The positive variation of demand for and supply of ratings suggests that the shortage of senior officers could be compensated with the additional education of ratings. On the other hand, the traditional division of positions on board, as well as big differences in education, indicate that the mentioned solution may not be good in the long run. This survey also indicates that the problem is rooted in two factors. The first is the quality of the educational system and the second is the lack of interest for navigation. The goal of the conducted survey was to define the most appropriate measures to encourage the interest in the seafaring careers. The identifying dynamics of the educational system needs to be determined. Contemporary economic paradigms proscribe sophisticated methods of workforce management, instead of manpower supervision characteristic of industrial paradigms. The main guestion here is how to develop quality seafarers whose competencies are the origin of new knowledge and competitiveness. To accomplish this goal we need to educate and ensure the development of employees, as well as to create an environment in which knowledge is acquired and shared, which entails trust, cooperation, team work and dedication to goals. A positive example are the German maritime industry and its human resources programs. Germany is trying to recover and recruit its seafarers by providing many facilities

and benefits. Due to its geographical characteristics, Germany developed continental industries. In the 19th century, the concept of the German merchant fleet became very significant. Since Germany didn't have market support like for example the United Kingdom or the Netherlands, it needed a state protocol that offered many benefits for the development of the maritime industry. The protocol established the role of Germany as a supporter of the maritime industry. This role continued throughout World War II, as well as in the post-war years. By that time the main workforce came to Germany from Spain, Greece, Italy and Turkey (Kundu et al., 2007). Today the majority of seafarers come from North America, Japan and European countries. The shipping industry is worried about the fact that over 40 % of officers are older than 50 years, and 18 % are over 55 years of age. The guestion here is why young people no longer wish to work in the shipping industry. One of the possible answers might be that the education for this career is very difficult, and one needs a lot of work experience to be promoted. This is why the EU is trying to attract as many young people as possible with special benefits. One of the countries that implemented such benefits is Croatia. These benefits are applied in the educational system, where one can become a senior officer without having a university diploma. Nevertheless, the seafarers need to attend many model courses to achieve the rank of senior officer. Nowadays seafarers don't need to graduate from university to reach higher ranks on board. Time will show whether this is a good or a bad solution. The fact is that it devalues university diplomas, which could become a big problem. In our opinion the crucial factors for advancement in the shipping industry are knowledge and experience.

According to BIMCO's study, the majority of seafarers comes from the Far East and minority from European countries (BIMCO/ ISF, 2000). Data from figure 2 show that the center of gravity of



Figure 2. Supply of seafarers by regions. Source: (BIMCO/ ISF, 2000).

the manpower industry has continued to move away from most of the traditional maritime countries in Europe, Japan and North America towards countries in the Far East, in the Indian subcontinent and Eastern Europe. Seafarers from OECD countries currently constitute some 27.5% of the marine global workforce compared to 31.5% in 1995 and there have been particularly substantial reductions in the numbers of junior deck and engine officers from OECD nations. But while these changes may well have been quite dramatic at the level of individual companies or countries, from the global perspective the overall 4% decline of OECD seafarers over a five-year period suggests that the changes are evolutionary rather than revolutionary.

3. EDUCATION OF SEAFARERS IN MONTENEGRO AND WORLDWIDE

Seafaring is specific because people involved in seafaring - seafarers - are subjected to many specific conditions which shape their career and education. Being a seafarer implies the need for constant improvement and knowledge verification due to the fact that since during navigation there are many risks affecting the safety of crew, cargo and ship, there is a constant need for everybody on the ship to work as a team. Seafarers are submitted to permanent knowledge and skill verification on the international labor market. Everything implies that seafaring requires continuous education, be it due to the rapid development of navigational equipment or for the sake of environmental protection. Senior officers need to know how to manage their crew in the frequent dangerous situations.

There are 3 common systems of seafarer education in the world:

- Traditional system,
- Gradient system (university and adept),
- University system (Ćorović, 2011).

Traditional system successfully combines theory and learning through practice. Practice additionally explains theory and makes career development easier. This system consists of several phases which individually last 2 or 3 months, with the whole system taking between 5 and 7 years to complete. The duration of this system is its biggest disadvantage, as well as the main reason why it is slowly being replaced by other more efficient systems. Many countries such as the United Kingdom, some Asian and African countries are still using this system but their tendency is to replace it.

Gradient system is much more popular and practiced in Western European countries, the USA, Australia, Canada, India, Philippines and Egypt. This system involves navigational practice lasting 6 - 12 months. Its total duration is 3 - 4 years after which the candidate acquires a BSc diploma (Bachelor of science) and STCW certificate OOW (Officer of the Watch), (Deck/engine); Mar off, Dual (Polyvalent officer). This type of education is provided at academies, independent universities, colleges and state universities. Following the adoption of the Bologna declaration, Montenegro started using this system of seafarer education. As a result, we have well-trained and educated seafarers.

University system is still being used in France, Spain, Greece, China, Poland, Russia, Bulgaria, Slovenia and Romania. There is a small difference between this system and the gradient system. After completion of this type of education candidates acquire a BSc diploma with the possibility to continue their education in postgraduate studies. During this type of education the main courses are: laws, economics, environmental protection, human resources management.

All systems that mentioned above have some similarities such as: they all meet requirements of STCW 95 convention, all of them combine theory and practice (working knowledge). They successfully prepare students for work on board.

Survey that we conducted among seafarers indicates that seafarers rate the maritime educational system with the average 3.3. Many seafarers are obviously unsatisfied with the educational system. Croatian seafarers believe that the main disadvantage is the fact that one can become a captain without having a university diploma, while Montenegrin seafarers believe that the main disadvantage is the lack of practice during education. As for compliance with IMO standards on universities, both Croatian and Montenegrin seafarers evaluated it with average mark of 3.5 which is satisfying. 53% of examinees find that knowledge and skills they obtained in school/university are applicable on ship while 46% think that such knowledge and skills are not applicable.

Examinees find that the significance of simulator in education is rather big and they have given average mark of 3.9. Examinees are indecisive about whether online learning should be part of educational methods for seafarers, 40% find that online learning should be part of educational system, 41% are not interested in online learning and 19% don't know whether it should be a part of the educational system. The majority of examinees, 63%, find contemporary methods of learning better, while 47% prefer traditional methods.

4. TRAINING AND DEVELOPMENT OF CAREER IN MARITIME INDUSTRY

Training is the planned process of formation of attitudes and acquisition of skills and knowledge through learning. The primary purpose of training is to improve employee performances to meet the needs of the company for certain profiles of employees. Training is considered a form of investment into employees to enable them to do certain jobs.

If we want to increase the level of knowledge and skills that seafarers need, we need to shape a certain model of



Figure 3. Evaluate maritime education.

education and training. Contemporary circumstances dictate the development of seafarers' knowledge and skills, as well as the acquisition of new ones. This is also requested by organizations controlling the education and training of seafarers. The main reason for such drastic changes in education and training is technological development. Over the last fifty years there have been many changes such as container ships. Every change in the maritime industry requires additional education and training of seafarers. However, many things remain the same, for example relations between crew members on board. A ship is an isolated social environment in which seafarers work and live. Autocratic crew management exists due to the hierarchy of the ship's crew. On board every crew member knows what his responsibilities are, who gives orders and who executes orders.

The recruitment of seafarers is a way to improve the competitiveness of a shipping company. Before recruiting new seafarers every shipping company should have a plan explaining the need for certain types of seafarers in the future. However, prior to the recruitment of seafarers it is essential to establish the amount of funds required to train new seafarers. If we take in consideration a seafarer's career, every seafarer needs to determine his goal and interest, in keeping with which he then plans his career. As far as seafarer's career is taken in consideration we might say that every seafarer is responsible for his own career. If they are well motivated and good mannered they will soon advance and develop their career. Nevertheless there are some conditions that need to be met, for example STCW convention precisely defines how many years of work experience a senior officer needs to have in order to become a captain. In order to advance, seafarers need to attend many model courses to acquire new knowledge and skills. Seafarer's knowledge and skills need

to stay abreast with technological development. Ignorance and irresponsibility cost a lot and might end a seafarer's career, (Pritchard, 2007).

Data from our survey indicate that 72 % of seafarers are going to quit sailing before retirement and only 28% of seafarers will retire as seafarers. This is a major problem for maritime companies, because they cannot find skilful seafarers and they need to invest money to training new ones.

Data collected in the survey indicate that 8% of examinees will quit sailing in less than a year, 22% of examinees will quit sailing in 1 to 5 years and 47% will quit sailing in 5 to 10 years, while 23% of seafarers will conduct their duties on board for 20 or more years. Examinees find that the main reason why young people are not interested in navigation is distance from family and friends and they gave it the average mark of 4.9, the second reason is the fact that young people are not encouraged by the government to navigate, with the average mark of 3.5. As the third reason they stated that salary and working conditions are not attractive enough compared to other professions, with



the average mark of 3.1. According to survey data, the least important reasons are the dangerousness of the seafarer's job, with the average mark of 2.7 and unfavorable condition on the world market, with the same mark.

As far as employment agencies are concerned, the survey data indicate that seafarers are not satisfied with their service. Seafarers find that employment agencies conform with international labor regulations and they gave them the average mark of 3.3. According to this survey seafarers are unsatisfied with employment agencies because they do not negotiate on behalf of seafarers, with the average score of 2. In seafarers opinion employment agencies are not doing enough to improve their service and examinees gave them the average score of 2.1.

5. CONCLUSION

The education of seafarers is a long-term process that needs to be well-planned in accordance with the new global trends. That is not an easy job because it requires a lot of effort, as well as the harmonization of national legislation with international conventions. Nowadays conventions are rapidly changing in order to improve the safety of navigation. Technological development calls for additional education and training of seafarers. Since keeping pace with all sophisticated new equipment is difficult, company management needs to assure its employees that additional education and training are in their best interest if they want to advance in their career. We mustn't forget the world economy which shapes the demand for seafarers. If the shipping industry is not doing well and is experiencing difficulties, many seafarers won't be able to find a job. Supply will exceed demand. Everything mentioned affects the plans for demand and is therefore of relevance for the education of seafarers. The interest of young people in navigation is also important. As illustrated

above, the majority of seafarers are old. The question is why this profession is becoming so unattractive to young people?! Being a small country, Montenegro needs to attract as many young people as possible into the shipping industry to reward those who put their efforts into educating new seafarers.

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On the Usage of the Lexemes Fathership, Fatherhood, Cousinship and Cousinhood

Siniša Ninčević

This paper concerns the semantic relation between the lexemes "fathership" and "fatherhood", "cousinship" and "cousinhood" in terms of their lexical properties and usage, i.e., the type of predicate the nominal base belongs to. As each of these juxtaposed pairs has the same nominal base ("father" and "cousin"), which can attach to both -ship and -hood suffixes, it is the selection of the particular suffix that can determine not only the type of predicate of the nominal base – considering the temporal spectrum in which a predicate can occur - but also the specific semantic information these lexemes can convey.

KEY WORDS

- \sim Suffixation
- ~ Nominal base
- ~ Lexical properties
- ~ Predicate
- ~ Specific semantic information

University of Split, Faculty of Philosophy, Sinjska 2, 21000 Split, Croatia e-mail: sinisa.nincevic@ffst.hr

1. INTRODUCTION

The lexemes "fathership", "fatherhood", "cousinship" and "cousinhood" have the nominal bases that are relational so their derivational output denotes that relation. These nominal bases, i.e., "father" and "cousin" can attach to both -ship and -hood suffixes. This paper will discuss these nouns both in light of the type of predicate the base belongs to and their usage in the English language. Exploring the semantics of -ship and -hood suffixations, Aronoff and Cho explain that such a derivation is based on the distinction between stage-level and individual-level predicates as predicate is an expression that is true of something in linguistic semantics.

A stage-level predicate applies to temporary properties of individuals, thus expressing unstable or transient stages (e.g. "friend"), as opposed to an individual-level predicate which pertains to lasting properties of individuals regardless of the particular point of time under consideration. They express stable properties of individuals such as in "mother" (Aronoff and Cho, 2001). The former will, in this respect, select the suffix -ship to form "friendship", whilst the latter will select the suffix -hood to form "motherhood".

What's more, Aronoff and Cho suggest yet another distinction in relation to individual-level predicates to explain the semantics of -hood derivations by means of subdividing them into left-side and right-side individual-level predicates in terms of the semantics of the nominal base as for its lexical properties in relation to the temporal spectrum – a point of time a predicate can occur - determined by the selection of a suffix. Left-side individual-level predicates (e.g. "child" – "childhood") will denote properties that individuals have at birth until a certain point in time, whereas right-side individual-level predicates will denote properties that individuals have from a certain point of time to the

end of their lives (e.g. "mother" – "motherhood"). Thus, according to Aronoff and Cho, the suffix -ship will attach only to bases that denote transient properties as stage-level predicates as is the case with "friend(ship)", and it will not not attach to "mother" for the nominal base "mother" is a right-side individual-level predicate that expresses stable properties of individuals. Instead, "mother" will select the suffix -hood to form "motherhood".

Therefore, the suffixes -ship and -hood are state-producing nominalisers, and the suffixed nominal base is a nominalisation. The nominal bases of -ship derivations are stage-level predicates predicating unstable properties of an individual within a certain time frame (e.g. "friend(ship)", "companion(ship)", "president(ship)", "judge(ship)", etc.). The suffix -ship will not attach to a base the semantics of which points to lasting properties of individuals as an individual-level predicate. On the other hand, the suffix -hood will occur with individual-level predicates to express stable properties of individuals ("child(hood)", "parent(hood)", "sister(hood)", "wife(hood)", etc.).

However, although the nominalisations "mother(hood)" and "child(hood)" meet either the right-side or the left-side individual-level requirements - as for the lexical properties of these derivations – they can also be perceived as inconstant predicates in relation to the starting point A and the ending point B since "mother(hood)" commences at a point different from the starting point A and lasts to the ending point B. "Child(hood)" occurs at the starting point A but ends at a point different from the ending point B. "Daughter(hood)" is, on the other hand, a constant predicate - with respect to the type of predicate its nominal base belongs to for it denotes perpetual properties (both left and right) - which occurs at the starting point A continuing up to the ending point B.

Nominal bases that will select the suffix -ship are inconstant predicates for they do occur at a point different from the starting point A and end at a point different from the ending point B. Accordingly, one can also speak of constant and inconstant predicates as for the lexical properties of the nominal base where -hood nominalisations can be both constant predicates to express perpetual properties of individuals on the condition that they occur not only at any point of time but also at each and every point of time considered, i.e., from the starting point A to the ending point B. Inconstant predicates express lasting, but not constant, properties of individuals on the condition that they occur from the starting point A to a point diferrent from the ending point B (left side of the temporal spectrum), as well as lasting, but not constant, properties of individuals occurring from a point different from the starting point A to the ending point B (right side of the temporal spectrum), i.e., occurring either on the left side or the right side of the temporal spectrum. As they occur at a point different from the starting point A and end at a point different from the ending point B, -ship nominalisations can be perceived as inconstant center predicates as well.

2. PERSONAL COMMON NOUNS: FATHER AND COUSIN

What strikes the eye in the English language is the occurrence of the nominal base "father" that can attach to both suffixes, -ship and -hood, to form "fathership" and "fatherhood", as well as the occurrence of another personal common noun, i.e., "cousin" that can take both suffixes as well. Interestingly enough, the New Webster Dictionary of The English Language enters the lexemes "cousinship" and "cousinhood" as the state of being cousins, i.e., as synonyms, but omits to enter the lexeme "fathership".

Personal common nouns "father" and "cousin", whose nominal bases are relational, can take both derivational suffixes to form nominalisations that denote those relations, thus conveying the specific semantic information determined by selecting either the suffix -ship or the suffix -hood.

The selection of either -ship or -hood suffixation depends on the type of predicate the base belongs to. As these nouns have the same nominal base ("father" and "cousin") and can attach to both suffixes, it is the suffix (nominaliser) that is critical to the specific semantic information these nouns can convey as nominalisations. The occurrence of "fathership" and "cousinship" in terms of their usage are, therefore, nouns in their own right.

A couple of extracts from American and British literatures to begin by The Last of the Mohicans will contextually illustrate Aronoff and Cho's stance on the occurrence of "fathership", whilst a dialogue taken from Jane Eyre, alongside a number of selected lines from English texts, will serve to tackle the usage of "cousinship" and "cousinhood".

3. FATHERSHIP AND FATHERHOOD

Aronoff and Cho explain the occurrence of "fathership" as opposed to "fatherhood" (the state of being a male parent) where the suffix -hood determines the specific semantic value of the base in terms of its lexical property, i.e., as an individual-level predicate denoting lasting properties regardless of a particular point of time we consider - as the condition or state of being the oldest member of a community (Trips:168). This nominalisation ("fathership") meets the stage-level requirement as it denotes transient property of individuals, but it can also be viewed as an inconstant right predicate since it occurs at a pont different from the starting point A continuing up to the ending point B.

In traditional societies, both past and present, it refers to an elder as an individual with a respected position due to his advanced age as exemplified in the following excerpts:

(1) "The dress of this patriarch - for such, considering his vast age, in conjunction with his affinity and influence with his people, he might very properly be termed - was rich and imposing, though strict after the simple fashions of the tribe" (Cooper: 348). (2) "Notwithstanding the position of the Huron, he passed the observant and silent Magua without notice, and leaning on his two venerable supporters proceeded to the high place of the multitude, where he seated himself in the center of his nation with the dignity of a monarch and the air of a father." (Cooper: 348).

The nouns "patriarch" and "monarch" along with "vast age" are followed by "the air of a father" to amplify the nature of his social attitude to others. Tamenund's father(ship) is undisputed in this social landscape. It is evident that age is of the utmost importance and determines the condition for -ship suffixation in "fathership" as it meets a stage-level requirement, i.e., a particular point of time of being the oldest member of a community as substantiated by the following lines:

(3) "They were all aged, even beyond that period to which the oldest present had reached; but one in the center, who leaned on his companions for support, had numbered an amount of years to which the human race is seldom permitted to attain." (Cooper: 347).

We are to discern father(ship) as state of being the oldest member of a community from the spiritual fathers (e.g. Father John, the Holy Father, the Church Fathers or America's Founding Fathers) for in these instances age is of no importance whatsoever (as compared with example 3). Alexander Hamilton, a Founding Father, was only 32 years old when the U.S. Constitution was signed in 1787 (DeCarolis:16). Both nouns, however, involve metaphoric quality that views venerable/spiritual/religious leaders as fathers.

4. COUSINSHIP AND COUSINHOOD

Inasmuch as this derivation is generally a complex linguistic phenomenon, "cousinhood" and "cousinship" stand out due to systems of degrees and removals that describe the relationship between two cousins (kinship) and the ancestor they have in common. The susceptability of the nominal base "cousin" to attaching to both suffixes can be explained by the specific semantic information that each of these derivations can convey. Namely, "cousin" is a relational noun, but in some instances it lacks the synchronicity of the "participants", such as in "cousin twice removed" or "thrice removed". "Removed", in this instance, refers to how many generations you can be separated from your cousin(s)/relatives, where, for example, "once removed" equals one generation.

Hence, the nominal base "cousin" will attach to the suffix -ship to simply express relatedness, i.e., a relationship, kinship or cousinship where, in this instance, these three -ship nouns have the same semantic value in terms of the lexical properties of the nominal base. The discovery of the existence of a genealogical link can happen at any point of time between the starting point A and the ending point B (example 4) in which case the predicate of the base meets the stage-level requirement in "cousinship".

As the degree of "first cousins" (sharing the same grandparent) meets the requirement of relational synchronicity, the nominal base will attach to the suffix -hood to express stable properties of individuals. However, in terms of the lexical properties of the base, i.e., the type of predicate the base belongs to, "cousin(hood)" can meet the individual-level requirement as both a constant predicate (occurring from the starting point A continuing up to the ending point B) and an incostant predicate (occurring at a point different from the starting point A) from the younger/older cousin perspective.

In the aforementioned dialogue between Jane Eyre and Mr. Rochester, the latter asks Jane:

(4) "St. John made you school-mistress of Morton before he knew you were his cousin?" "How long did you reside with him and his sister after the cousinship was discovered?" (Brontë: 442). As the story unfolds, the reader learns of St. John and Jane's relationship/cousinship.

By extension, "cousinship" is also used to denote something similar in quality or character (Ninčević, 2009) - we can also speak of the quality or character of Jesus's sonship - or an interesting or unusual quality exemplified in an array of literary examples:

- (5) "What he repudiated was cousinship with the ape, and the implied suspicion of a rudimentary tail..." (Shaw: 28).
- (6) "He describes a beautiful thought experiment to demonstrate a rabbit's cousinship to a leopard." (Wade: 22).
- (7) "His creed of determination was such that it almost amounted to a vice, and quite amounted, on its negative side, to a renunciative philosophy which had cousinship with that of Schopenhauer and Leopardi." (Hardy: 157).
- (8) "Symmetry establishes a ridiculous and wonderful cousinship between objects, phenomena, and theories outwardly unrelated..." (Bishop: 1).

5. CONCLUSION

The said "cousinship" examples, save for the conversation between St. John and Jane Eyre, do not imply any family relations or reference to a member of a group of people with similar origins, be it cousins twice or thrice removed, etc. Still, the nominalisation "cousinship" is, for that matter, evidently possible in the English language and used not only to denote a cousinly relation(ship) in view of the aforementioned context – with regard to the type of predicate of the nominal base - but also to convey another piece of specific semantic information, i.e., an abstract idea of the quality of relatedness which generally covers a number of subject areas (examples 5, 6, 7, 8).

The nominal base "cousin" can also be suffixed with -hood

to express stable properties of individuals either as a constant predicate or an inconstant predicate as for the lexical properties of the nominal base. Examples (1, 2, 3) suggest that the lexemes "fathership" and "fatherhood" are synonymous to a certain extent for they can convey their specific semantic information in terms of the predicate of the base, respectively. Likewise, this paper has considered and viewed the temporal extent of these nominalisations from another possible perspective, and is hence open to further research.

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News from International Maritime Organization

Tatjana Krilić



Detail from the main hall in the IMO

INTRODUCTION

This first review of the current work of International Maritime Organization (IMO) bodies covers selected decisions and outcome of discussions of the *Sub-Committee on Standards of Training and Watchkeeping (STW)*, which met at the Organization's London Headquarters for its 43rd session from 30 April 4 May 2012, and of the *Maritime Safety Committee (MSC)*, which held its 90th session from 16 to 25 May 2012.

International Maritime Organization, 4 Albert Embankment, London, SE1 7SR e-mail: tkrilic@imo.org

43rd session of the Sub-Committee on Standards of Training and Watchkeeping (STW 43)

Guidance and model courses were agreed by STW 43 relating to the implementation of the Manila Amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, and the Seafarers'Training, Certification and Watchkeeping (STCW) Code, which were adopted in Manila, the Philippines, in June 2010 and entered into force on 1 January 2012.

The Sub-Committee also endorsed, for subsequent approval by MSC and the ILO Governing Body, the revised Guidelines

for Medical Examination of Seafarers, which were developed jointly by IMO and the International Labour Organization (ILO) to implement the international standards for medical fitness for seafarers set out in the STCW Convention, as amended, and the Maritime Labour Convention (MLC), 2006, in order to promote and support their effective, uniform, global implementation.

The Sub-Committee approved a draft STCW.7 circular providing guidance on Electronic Chart Display and Information System (ECDIS) Training. A number of guidance to STCW Parties was agreed, for submission to the MSC for approval, and four model courses have been updated to provide the necessary guidance to maritime Administrations and training institutions to develop their training programmes to meet the new standards set out in 2010 Manila Amendments to the STCW Convention and Code.

The Sub-Committee agreed draft amendments to the STCW Convention and Code, to make mandatory the draft IMO Instruments Implementation Code, which has been developed by the Sub-Committee on Flag State Implementation (FSI) and is being forwarded for consideration and approval by the Maritime Safety Committee (MSC) and the Marine environment Protection Committee (MEPC), for submission to the Assembly at an appropriate session, for adoption. The proposed amendments would mean that the STCW Convention and Code would also be added to the list of mandatory IMO instruments intended to be covered by the mandatory audit scheme being developed to replace the current Voluntary IMO Member State Audit Scheme. Areas expected to be covered under the mandatory audit scheme would include issues related to: confirming that a STCW Party had completed the process to be confirmed as giving full effect to the STCW provisions; issuance of dispensations; port State control and watchkeeping provisions; quality standards systems; and reporting of independent evaluations.

Other topics discussed by STW 43 include ISM Code efficiency and user friendliness, contingency planning guidelines, guidelines on safety when transferring persons at sea and gap analysis for training aspects of e-navigation.

90th session of the Maritime Safety Committee (MSC 90)

Piracy and armed robbery against ships

Piracy and armed robbery against ships off the coast of Somalia, in the Gulf of Aden and the wider Indian Ocean was high on the agenda of MSC 90. An intense debate on how the international community should deal with issues related to the deployment of privately contracted armed security personnel (PCASP) on board ships and the carriage of arms on board took place during a special high-level segment of the MSC.

MSC agreed an Interim Guidance for private maritime security companies (PMSCs), providing privately contracted armed security personnel (PCASP) aboard ships transiting the high-risk area off the east coast of Africa.

Passenger ship safety

A resolution recommending operational measures aimed at enhancing the safety of large cruise passenger ships, as well as a work plan to address passenger ship safety matters, in the wake of the Costa Concordia incident in January has been adopted. The MSC agreed that a number of operational measures should be implemented immediately, on a voluntary basis, prior to the adoption of any measures following the analysis of the official marine investigation report into the loss of the Costa Concordia;

Amendments to the International Convention for the Safety of Life at Sea (SOLAS 1974)

Amendments have been adopted, inter alia, with expected entry into force on 1 January 2014, as follows:

- SOLAS regulation II-1/8-1, to introduce a mandatory requirement for new passenger ships for either onboard stability computers or shore-based support;
- SOLAS regulation III/20.11.2 regarding the testing of freefall lifeboats, to require that the operational testing of freefall lifeboat release systems shall be performed either by free-fall launch with only the operating crew on board or by a simulated launching;
- SOLAS regulation V/14 on ships' manning, to require Administrations, for every ship, to establish appropriate minimum safe manning levels following a transparent procedure, taking into account the guidance adopted by IMO (Assembly resolution A.1047(27) on Principles of minimum safe manning); and issue an appropriate minimum safe manning document or equivalent as evidence of the minimum safe manning considered necessary; and
- SOLAS chapter XI-1 regulation XI-1/2 on enhanced surveys, to make mandatory the International Code on the Enhanced Programme of Inspections during Surveys of Bulk Carriers and Oil Tankers, 2011 (2011 ESP Code, resolution A.1049(27)).

Adoption and approval of other guidelines, codes and circulars, submitted by the IMO Sub-Committees

The MSC adopted amendments to the following Codes, mandatory under the SOLAS Convention, with expected entry into force on 1 January 2014:

- International Code of Safety for High-Speed Craft, 2000 (2000 HSC Code), relating to radiocommunication, on testing of satellite EPIRBs;
- International Code for Fire Safety Systems (FSS Code),



relating to fixed foam fire extinguishing systems; and automatic sprinkler, fire detection and fire alarm systems;

 International Maritime Dangerous Goods (IMDG) Code and supplements (amendment 36-12), including harmonization of the Code with the amendments to the UN Recommendations on the transport of dangerous goods, seventeenth revised edition. LRIT status updated

The MSC was informed that the International LRIT Data Exchange (IDE) had been fully operational at the European Maritime Safety Agency (EMSA) premises, in Lisbon (Portugal), since 18 October 2011. The offer of the EU States for the continued hosting, maintenance and operation of the IDE by EMSA, beyond 2013, at no cost either to the SOLAS Contracting Governments or to the Organization, was welcomed by the Committee. The MSC also welcomed the offer of the United States to continue hosting, maintaining and operating the disaster recovery site of the IDE, beyond 2013, at no cost either to the SOLAS Contracting Governments or to the Organization, with the possibility of reviewing such decision should the circumstances change in the future.

The Committee adopted updated and amended performance standards for LRIT and approved a number of updated and amended circulars relating to LRIT operations.

STCW Convention: independent evaluations considered

The MSC considered the Secretary-General's report on a number of countries whose independent evaluations have been completed since the previous MSC meeting and confirmed that 12 STCW Parties and five overseas territories of one STCW Party continued to give full and complete effect to the provisions of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, as amended.

Amendments to IMO instruments that have entered into force on 1 July 2012

- Amendments to SOLAS to make mandatory the International Code for the Application of Fire Test Procedures (2010 FTP Code);
- amendments to SOLAS regulation V/18 to require annual testing of automatic identification systems (AIS);
- amendments to SOLAS regulation V/23 on pilot transfer arrangements;
- amendments to safety certificates in the SOLAS appendix and SOLAS Protocol of 1988, relating to references to alternative design and arrangements;
- amendments to the International Convention for Safe Containers, 1972, to include addition of new paragraphs in Regulation 1 Safety Approval Plate, and the addition of a new Annex III Control and Verification; and
- a new chapter 9 of the International Code for Fire Safety Systems (FSS Code), related to fixed fire detection and fire alarm systems.

The Never Ending Story of Training Ships

Marijan Žuvić

TEACHING ON THE WAVES: THE GERMAN SAILS

The history of training ships in the world of navigation, both merchant and naval, is a never ending story. From the age of sails, through the days of steam and motor propulsion to the most sophisticated vessels of 21st century there were so many ships of all sizes and shapes used as schools on the waves. To make a choice and declare 'the most famous training ships' is the mission impossible and so this author doesn't dare to do such a selection.

Training ships are not only the essential part of world-wide shipping but also one of the most interesting. The conclusion of a search through the author's huge personnel archives the author is that the major role in the entire history of training on the high seas belongs to Germans. As this fact is not widely accepted and German importance and influence is not recognized even in the maritime community it is worth to be presented in ToMS.

It is generally accepted that the first training vessel in the world was the British ship 'Marine Society'. She was former merchantman 'Beatty' purchased in 1786 by London-based Marine Society. There is no doubt that Society, founded in 1756 by Jonas Hanway, was the world pioneer in training boys for seafaring duties, but the ship 'Marine Society' never sailed and spent her entire career moored between Deptford and Greenwich in the Thames.

The first records on vessels actually sailing with cadets comes from Germany. In 1844 the Prussian Navy used sailing corvette 'Amazone' as the training vessel (Schulschiff in German). Four years later in the Navy of Deutschen Bundes (German Confederation) served training frigate 'Deutschland'. At the same time the Navy of Schleswig-Holstein used schooner 'Elbe' for training. In 1861 Prussian corvette 'Amazone' was replaced

Agencija za Obalni Linijski Pomorski Promet, Ulica grada Antofagaste 6, 21000 Split e-mail: marijan.zuvic@agencija-zolpp.hr



Herzogin Cecilie.

by 'Niobe', being followed by training vessels 'Mercur', 'Gefion', 'Thetis' and 'Arcona'. Strong tradition of practical training for future naval officers had been continued by the German Imperial Navy. Three-masted steam corvettes with auxiliary sails 'Moltke', 'Stosch', 'Stein', 'Gneisenau' and 'Charlotte' were the best known training ships before the First World War.

At the end of the war the Imperial Navy ceased to exist. The entire surviving fleet had been taken by the Allies as a prize. Persistent to keep the tradition of teaching the seamanship Navy of the Weimar Republic, as early as 1922, acquired a 4-masted





The biggest ever - 'R.C. Rickmers'.

1913-built steel hull schooner. Originally she was Danish vessel 'Morten Jensen'. Rebuilt into a 3-masted barque she was christened 'Niobe' in the memory of previous Prussian training vessel.

Ten years later 'Niobe' met her tragic end. In the summer of 1932 she was on the training routes in the Baltic Sea with 35 crew members and 74 cadets onboard. July 26th was a very warm day and she sailed with all hatches and portholes opened. While in the vicinity of Fehmarn Island a sudden squall hit 'Niobe'. She capsized and sank within minutes. Freighter 'Theresia L.M. Russ' and the crew of Fehmarn lighthouse managed to rescue 40 lives while the remaining 69 were lost.

Sinking of 'Niobe' was especially tragic for the post-war Germany, being the greatest maritime disaster of that time. It seemed certain that the very idea of training sailing ships would be abandoned. But Germans surprised shipping world: in the wake of 'Niobe' tragedy Kriegsmarine ordered four new sailing schoolships at the renowned shipyard of Blohm & Voss at Hamburg! Being state of art ships these 3-masted steel barques are generally considered the best training vessels ever. The proof of that opinion is fact that, using 1933 blueprints, the identical vessel was built in 1958. She is still sailing and four of her precedents from 30's are afloat these days.

Only four months after the 'Niobe' disaster work began on 'Gorch Fock'. She was launched on May 3rd and delivered to the German Navy on June 26, 1933. Lesson of the Baltic tragedy was learned: new ship had a righting moment large enough to bring her back in the upright position even when she heels over to nearly 90 degrees!

The second sister 'Horst Wessel' had also been constructed fast. Keel was laid down on February 15th, she was launched on June 13th and commissioned on September 17th – all of 1936. Next year Blohm & Voss delivered ship 'Albert Leo Schlageter'. Construction of the fourth ship 'Herbert Norkus' began in 1939 but due to the war she was not completed. In 1938 identical ship named 'Mircea' was built for the Romanian Navy.

Three German sisterships survived the war and were quickly seized by the Allies. 'Gorch Foch' became the Soviet Navy's 'Tovarisch' while 'Horst Wessel' and 'Albert Leo Schlageter' were taken over by Americans. The first one became Coast Guard training ship 'Eagle'. 'Albert Leo Schlageter' was sold to the Brazilian Navy and sailed as 'Guanabara'. In 1961 she was acquired by the Portuguese Navy to become 'Sagres'.

But that was not the end of story on 'Gorch Foch' class. A quarter of century after the original 'Gorch Foch', in 1958 Blohm & Voss built the very same ship of the very same name for the German Navy. Design was so successful that Spanish shipyard Astilleros Celaya at Bilbao, between 1968 and 1982, built four similar ships for the South American navies: 'Gloria', 'Guayas', 'Simon Bolivar' and 'Cuahtemoc'.

In the shadow of the celebrated schoolships of 'Gorch Fock'



'R.C. Rickmers' as 'Neath'.

class is a story of numerous German merchant marine training vessels. German fleet of ships created to prepare young men for duties on all kinds on cargo-carrying steamers and motorships had been the biggest in the world. In the general perception of 20th century Britannia rules the seas, but true master of sailing



'Magdalene Vinnen'.

and teaching routes was Germany.

At the turn of centuries two German figures emerged in the world of mercantile training ships: respected shipping company Norddeutscher Lloyd of Bremen and Deutscher Schulshiff-Verein (German Schoolship Association) of Oldenburg. The major difference was in fact that ships of NDL were used for training during commercial voyages and DSV ships carried no cargo and served exclusively for training.

The first step was made at the very end of 19th century: in 1899 Bremen owners purchased huge 4-masted steel barque 'Albert Rickmers' of 2.591 gross tons. Built five years earlier at Bremerhaven she was converted into a training ship and renamed 'Herzogin Sophie Charlotte'. Her training duties ceased in 1913 when was sold to shipowners Schluter & Maak.

Next ship was a brand new 'Herzogin Cecilie', also 4-masted steel barque, of 3.242 gross tons. She was also Bremerhaven born, being built in 1902. In 1919 she was allocated to France as part of war reparations but soon went under Finnish flag for commercial sailing. Still carrying original German name she became total loss in April 1936 after running aground at Sewer Mill Cove, Devon.

Oldenburg association started in 1901 with full-rigged steel ship 'Grossherzogin Elizabeth', a newbuilding from Tecklenborg yard at Geestermünde. She was the only training ship to remain under German flag after the First World War. But her turn came in 1946. Allocated to France she became 'Duchesse Anne', training ship of the French Navy. After only six years she was withdrawn to be used as an accommodation ship. Now she is permanently moored at Dunkirk.

The second newbuilding came in 1910 from Blohm & Voss shipyard. It was full-rigged ship 'Prinzess Eitel Friedrich'. In 1919 she was taken over by the British, but in 1920 became French 'Colbert' of the St. Nazaire's maritime school. Sold in 1929 to Poland she became 'Dar Pomorza', training ship for Gdynia Naval Academy. She remained in service until 1982, and now is very popular museum ship at her home port.

The last of the trio, 'Grossherzog Friedrich August', came from Geestermünde yard, being delivered in 1914. Shortly after the Peace Treaty she was taken by British and in 1921 sold to the Norwegians. Being renamed 'Statsraad Lehmkuhl' she is still, after 90 years, active in training of Norwegian cadets.

The honor of the biggest training ship in German history goes to the huge sailing freighter 'R.C. Rickmers', 5-masted steel barque with auxiliary engine. This giant was of 5.548 gross tons and cargo capacity of 10.500 tons, 146 meters in length overall and beam of 16.3 meters. She was built at Bremerhaven by Rickmers shipbuilding and shipowning company for own fleet. But, she was also remembered for the shortest career of all the training ships. In 1914 Rickmers was celebrating company's 80th anniversary and fitted her out for training. Few months later, in August 1914, she was seized at Cardiff by the British as a war prize, renamed 'Neath' and immediately transferred to cargo routes. On March 27, 1917 she was sunk by German submarine U 66 off the Irish coast.

After the Peace Treaty of 1919 the German merchant marine disappeared. In 1923 Deutscher Schulschiff-Verein returned to the scene with 4-masted barque 'Oldenburg'. She was former French 'Laennec', built in 1902 at St.Nazaire. In 1928 she passed under Norddeutscher Lloyd ownership but kept training until 1930 when was sold to the Finnish Navy. As 'Suomen Joutsen' she was in active duty until 1956 when became a stationary schoolship at Turku.

Four years later from Tecklenborg yard at Wesermunde came the first newbuilding, 5-masted full-rigged ship 'Schulschiff Deutschland'. She kept sailing until 1939 on overseas routes



'L'Avenir' was lost as 'Admiral Karpfanger'.



and until 1944 in Baltic Sea only. In 1952 she became stationary training ship at Bremen. Today is moored at Vegesack as a museum ship. She was followed by barque 'Schulschiff Pommern'. Purchased in 1928 she was 12 years old and spent her youth as cargo carrying 'Elfrieda'. Her training career proved very short! In November of the same year she was hit by gale in English Channel. Being dismasted and heavy damaged she was broken up at the beginning of 1929.

In the mid-20's various German shipowners emerged with training vessels for their own officers. Four ships arrived in 1924 alone. Gebrueder Vinnen of Hamburg purchased in France fullrigged steel ship 'Edouard Bureau'. She was a real veteran, being built back in 1892 at Sunderland as British 'Winscombe Park'. After necessary adjustments for training duties she was renamed 'Grief'. But her career was a short one: three years later she was scrapped at Belfast.

Old Bremen company Adler Reederei purchased Swedish barque 'Bohus' which soon proved ill-fated. Also the 1892 veteran she was originally German owned 'Bertha', built at Grangemouth. After only few months of service 'Bohus' was wrecked on Shetland Islands in April 1924.

Two French built ships, 'Bremen' and 'Hamburg', also entered fleet in 1924 being purchased by Bremen Shipowners' Association (Bremer Rhederverein). 'Bremen' was built in 1902 at St. Nazaire as French 'Rene' and came under German flag in 1921 as 'Lisbeth'. She sailed as a training ship for nine years before being scrapped. And 'Hamburg' was a schoolship for less that a year! Being built in Nantes in 1901 as French 'Marechal de Castries', she shortly sailed as German 'Henriette'. Purchased by BSA in 1924 she entered training in 1925 and went to the scrapyard in 1926!

In 1936 Norddeutscher Lloyd acquired 4-masted steel barque 'Magdalene Vinnen' of 3.476 GRT, built in 1921 by famous



Ill-fated 'Pamir' in her better days.



'Peking' as a museum ship at New York City.

Krupp Germaniawerke yard at Kiel. She was converted into training barque 'Kommodore Johnsen'. Luckily survived the war, she was allocated to the Soviet Union as reparations and renamed 'Sedov'. Under the very same name she is sailing for 67 years now, presently being a training ship for the Russian naval school at Murmansk.

In 1937 well-known shipping company Hamburg-Amerika Linie purchased former Belgian training ship 'L'Avenir' and christened her 'Admiral Karpfanger'. She was already 30 years old, being built in 1907 at Bremerhaven. In 1932 she went under Finnish flag without change of name and was used for cargo carrying. She returned to training in 1937 as 'Admiral Karpfanger' but only a year later was lost with all hands. Her loss remained one of the biggest mysteries of the seas.

On February 8, 1938 she left Port Germain in Southern Australia fully laden with 3500 tons of wheat in bags for Hamburg. A month later 'Admiral Karpfanger' with 27 crew and 33 cadets reached Cape Horn area and on March 12th sent short radio message 'All well'. And not heard of again. Many ships searched for her but in vain. The months later the wreckage discovered on Navarin Island near Cape Horn was identified as parts of 'Admiral Karpfanger'. Investigation of the tragedy was closed with conclusion that 'the most reasonable assumption is that the vessel struck an iceberg, probably at night, and foundered very suddenly.'

The very last entry on German schoolships was made in 1938 when Hamburg based tanker owner John T. Essberger purchased wooden vessel 'Bandi'. This ship was built back in 1919 in Gulfport, Mississippi as American 4-masted schooner 'Elizabeth Bandi'. When sold to Finland in 1931 her name was shortened to 'Bandi'. For training duties she was re-rigged to barque and renamed 'Seute Deern'. Her sailing career ceased in 1947 when she became floating hotel at Hamburg.

Zucker kommt zuletzt, according to the old German proverb, and it is the story of famous Flying P Line. Still existing

Hamburg company Reederei F. Laiesz was founded back in 1824 and became world famous as the highest quality fleet of sailing vessels. At all the company operated a total of 86 sailing vessels, 66 of which bore names beginning with a 'P'. As these sailing ships, carrying mainly Chilean nitrate cargoes around Cape Horn, were extremely fast, the Laiesz's fleet was called Flying P Line.

Five 'P' 4-masted steel barques were used for training. The oldest one, 'Pamir', had the most adventurous life becoming, at the very end, one of the symbols of disasters at sea. She was built in 1905 by Blohm & Voss at Hamburg. Being of 3.181 GRT she was 96.4 meters in length and 14 meters in breadth. After the First World War, according to the Treaty of Versailles' stipulations, nearly all German merchant ships were turned over to the Allies as war compensation. So were the 'Flying P Line' ships and 'Pamir' was awarded to Italy.

But at the beginning of 1920's Laiesz company managed to bring back six ships, including the 'Pamir'. In 1931 she was sold and became a part of famous Finnish 'grain fleet' operated



'Padua' as Russian 'Kruzenshtern'.



'Sagres' was originally 'Albert Leo Schlageter'.

by Capt. Gustav Erickson, the last big owner of sailing ships in the world. Ten years later 'Pamir' was seized by New Zealand as a war prize. Being returned to Capt. Erickson in 1949 she sailed to Europe only to be sold for scrap to Dutch company V.F. van Loo, together with six years younger sistership 'Passat', also built by Blohm & Voss.

In 1951 both ships were saved from breakers by Lubeck shipowner Heinz Schliewen. He was keen to revive long German tradition of training under the sail. Both ships were sent to Howaldtswerke yard at Kiel for a complete refit. On December 18, 1951 'Pamir' sailed from Hamburg for Rio de Janeiro with 50 cadets onboard. 'Pamir' and 'Passat' proved a complete success and Schliewen purchased two more ships. Famous 4-masted barque 'Moshulu' and 5-masted schooner 'Carl Vinnen' were intended for training. But crisis changed his plans entirely!

'Pamir' and 'Passat' were laid up, while 'Moshulu' and 'Carl Vinnen' were resold. In 1955 the group of German shipowners established foundation Pamir und Passat Stiftung to operate famous training ships. Unfortunately the 'Pamir' disaster was waiting to happen! On August 10, 1957 she left Buenos Aires with 86 souls, 35 crew and 51 cadets, laden with barley for Hamburg. Forty-one days later she had a tragic encounter with hurricane 'Carrie' in the middle of Atlantic, some 600 miles west of Azores. The struck of wind was so intense that crew hadn't time to shorten sails. 'Pamir', driven by enormous strength of wind started to list to portside. Finally she capsized and sunk very quickly. Radio distress call was sent but the nearest ships were hundred miles away. Sinking of 'Pamir' proved a great disaster: there were only six survivors.

And only six weeks later 'Passat' managed to escape the same fate and arrived at Lisbon heavily damaged in a storm. She was soon withdrawn from service and in 1959 sold to the City of Lubeck for use as a cadet's accommodation ship.

Training ships of the Flying 'P' Line were also 'Peking'

and 'Priwall'. These 4-masted steel barques also came from Blohm & Voss, being built in 1911 and 1920, respectively. Like other German ships 'Peking' was taken over by Italians as war reparations but was repurchased by Laeisz company in 1922. She spent a decade on training routes and in 1932 went to Britain to become 'Arethusa', stationery training ship in River Medway. In 1975 she once again crossed the Atlantic! She was sold to the Americans to be a part of South Street Seaport Museum in New York City, where she is still moored under her original name 'Peking'.

Her sistership 'Priwall' was not so lucky. The outbreak of the Second World War met her at Valparaiso were she was interned

by Chilean Government. Willing to save her from possible seizure by the Allies, German in 1941 donated 'Priwall' to the Republic of Chile. Allocated to the Chilean Navy she was used as a cargocarrying training ship 'Lautaro'. She met her end on February 28, 1945 off the Peruvian coast. Laden with cargo of nitrate she was completely destroyed by fire.

The very last of Laeisz's training ships was 4-masted steel barque 'Padua' coming from Tecklenborg yard of Wesermunde in 1926. Twenty years later she was seized by Soviet Union as a war prize and renamed 'Kruzenshtern'. She is still sailing as a training ship, now under the Russian Navy ensign.



The second 'Gorch Foch' was built in 1958.

Risk Assessment

Risk assessment has been made mandatory by the amendments 6 to the ISM Code in force from July the 1st 2010. Formal Safety Assessment (FSA), as part of IMO rule-making process, was adopted in 2002, with the goal to ensure that action is taken before a disaster occurs, unlike the more common practice in the past that the new regulations are adopted as a consequence or answer to the serious accidents. We can remember "Titanic" or "Estonia" only as examples of the reactive regulatory approach. FSA is used to evaluate proposals for new regulations or to compare proposed changes with existing standards enabling a balance to be found between the various technical and operational issues, including the human element, and between safety and costs of implementation of the new rules, as "a rational and systematic process for assessing the risks associated with shipping activity and for evaluating the costs and benefits of IMO's options for reducing these risks."

FSA consists of five steps:

- identification of hazards (a list of all relevant accident scenarios with potential causes and outcomes);
- 2. assessment of risks (evaluation of risk factors);
- risk control options (devising regulatory measures to control and reduce the identified risks);
- cost benefit assessment (determining cost effectiveness of each risk control option); and
- 5. recommendations for decision-making (information about the hazards, their associated risks and the cost.

What is the Difference between Fatigue and Sleepiness?

Fatigue is commonly described as a state of physical and/or mental exhaustion that can be caused by a wide range of factors, including long hours, shift work, inadequate rest and international travel. It can result in a progressive decline in alertness and performance, a loss of energy and slowed movements and reactions.

Sleepiness is often used to describe the state of fatigue.

Influence of fatigue

Laboratory research and studies in other transport modes have demonstrated that severe sleepiness (and even sleep onset) and performance deterioration is common amongst workers undertaking night shifts.

Fatigue is an important health issue, with significant



From the movie Modern times. Source: Flickr.com



evidence to show the way in which long-term sleep loss can be a risk factor in such conditions as obesity, cardiovascular disease and diabetes.

The increasingly intensive nature of shipping operations means that seafarers frequently work long and irregular hours. And factors such as noise, vibration, sailing patterns, port calls, cargo handling and other activities can all reduce the ability of seafarers to gain quality sleep during their rest periods. Seafarers are already usually covered by company, sector specific, flag state or IMO rules banning or severely restricting alcohol use at sea. Studies have shown that around 22 hours of wakefulness will have a similar effect upon the impairment of an individual's performance as a blood-alcohol concentration of 0.10% -- double the legal driving limit in most EU member states.

Is safety always first?

The role of fatigue and sleepiness in other safety-critical industries and in other modes of transport has been extensively researched. In contrast, there has been very little shipping based research and studies of seafarers' working hours and it has been largely over the past 20 years that an increasing weight of evidence gathered from research among seafarers and analysis of the role of fatigue in accidents at sea has begun to emerge.

Project Horizon was established in response to growing concern about the increased evidence of the role of fatigue and sleepiness in maritime accidents. The project is therefore closely aligned to the FP7 (Sustainable Surface Transport 2008 RTD-1 call) aims of increased safety and security, and reduced fatalities. Over the past 20 years, the shipping industry has become increasingly aware of the importance of the 'human factor' in safe shipping operations. The increased complexity of ships' systems and the growing technological sophistication of onboard equipment have placed greater emphasis on the performance of seafarers – and watch keepers in particular. The marked increase in the size of passenger ships and cargo vessels has also highlighted the potential for substantial loss of life or pollution in the event of an accident. As awareness of the importance of the human factor in shipping has grown, recognition of the role of fatigue in maritime safety has also increased. There have been a number of high-profile and often costly and damaging casualties in which seafarer fatigue has been shown as a key causal factor.

These include:

- the Exxon Valdez tanker disaster in 1989. The US National Transportation Safety Board found that in the 24 hours prior to the grounding of the ship, the watch-keeper had only had five or six hours of sleep;
- the grounding of the general cargo ship *Jambo* in Scotland in June 2003, after the chief officer fell asleep and missed an intended change of course;
- the grounding of the bulk carrier Pasha Bulker near the port of Newcastle in Australia in June 2007, in which an investigation report stated that 'the master became increasingly overloaded, and affected by fatigue and anxiety;
- the grounding of the feeder containership *Cita* in the Isles of Scilly in March 1997, after the mate fell asleep and the ship sailed for two and a half hours with no one in control;
- the death of a Filipino AB in a fall onboard the Danishflagged general cargo ship *Thor Gitta* in May 2009. Investigators who used FAID fatigue assessment software found that the seafarer's 6-on/6-off work pattern was at a score of 111 on the morning before to the accident – a level considered to be in the very high range;
- the grounding of the bulk carrier Shen Neng 1 on the Great Barrier Reef in April 2010. The Australian Transport Safety Bureau investigation found that the grounding occurred because the chief mate did not alter the ship's course at the designated position. His monitoring of the ship's position was ineffective and his actions were affected by fatigue. Investigations showed that he had only two and a half hours sleep in the 38.5 hours prior to the casualty.
Fatigue and Performance Results

The full results can be found at www.project-horizon.eu. However, the following general conclusions can be drawn:

- The data supports previous research findings and circadian theory. Watch keepers are most tired during the night watches and also show signs of tiredness in the afternoon;
- Sleepiness and neuro-behavioral performance, as measured by the EEG electrodes, are particularly affected towards the end of the 00.00-06.00 watch. Sleepiness and fatigue are enhanced and brain performance reduced. In addition, there is a gradual increase of fatigue during the work periods as the week progresses;
- Occurrences of small periods of sleep have been shown through analysis of the EEG recordings, both on the bridge and in the engine room. About 20% of participants fell asleep at some point during the 6/6 watch regime;
- From the evidence of the sleep diaries, The 6 hours on /6 hours off watch regime is more tiring than the 4on/8off;
- The onset of tiredness on the 6on/6off was apparent over a shorter time frame than might have been predicted by previous research;
- "Disturbed" rest periods produce significantly higher levels of tiredness: the quality of sleep is more significant than the workload;
- The data appears to be robust enough to provide input to future marine-validated fatigue prediction models.

This final point is an important one. It is hoped that HORIZON, in addition to providing guidance to individual seafarers and managers on ensuring good quality sleep, will be able to make a major contribution to the welfare of seafarers by contributing data to the production of fatigue prediction software. Such technology will help seafarers to plan their work schedules and disturbances to the normal watch keeping patterns in such a way as to mitigate the risk of fatigue. The analysis of "naturalistic" performance is still ongoing but a number of problems and issues have been encountered, which may be of interest to future researchers. These include:

- Some "events" were not as repeatable as others, for example, although some events involving repetitive procedural responses are easily initiated, other events such as collision avoidance situations are not so easily set up on every occasion.
- 2. Some performance criteria for measuring performance during these events are more valid and reliable than others.
- 3. Watch handovers were a significant source of data for checking alertness and the overall performance of watch keepers. As noted before, in the light of the Shen Neng1 grounding, handovers represent a major opportunity for errors to occur. There appeared to be a significant deterioration in watch handover performance as the week progressed, and this will need to be verified.
- 4. There was significant variability in the competence displayed by watch keepers. This was due to the randomness of the candidate selection process. Although there were good performers, there were also some watch keepers who seemed barely competent.
- Social interaction and levels of communication appeared to be related. When bridge and engine room watch keepers got on well in the mess room, this translated into effective communication on watch. When personality or other differences between participants were apparent, communication suffered.
- Some procedural tasks (drills) seem more resilient to fatigue than novel situations requiring thought (cognitive skills). In addition, some watch keepers were apparently more resilient to fatigue, but we need to investigate what factors might influence this.

Southampton Solent University, Maritime & Technology Faculty, East Park Terrace Southampton, Hampshire SO14 0YN

e-mail: mike.barnett@solent.ac.uk



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How to Control Working Hours of Seafarers?

Under International Labour Organisation regulations (social provisions) it is permissible for seafarers to work up to 91 hours a week - and, under the International Maritime Organisation's Standards of Training, Certification & Watch-keeping (STCW) 2010 amendments (safety provisions), a 98-hour working week is allowed for up to two weeks in 'exceptional' circumstances. The 2010 'Manila Amendments' require a minimum of 77 rest hours in any seven-day period. The hours of rest may be divided into no more than two periods per day, one of which shall be at least six hours in length, and the intervals between consecutive periods of rest shall not exceed 14 hours. Exceptions to the requirements are permitted in the case of an emergency or in other overriding operational conditions. A party to STCW (usually the administration of the flag state) may also allow exceptions from the required hours of rest provided that the rest period is not less than 70 hours in any seven-day period – and these exceptions cannot be permitted to extend for more than two consecutive weeks. The intervals between two periods of such exceptions shall not be less than twice the duration of the exception.



Auckland Seafarers Maritime Union of New Zealand members at Fullers, Ports of Auckland, August 2008. Source: Flickr.com

IMO Agrees Guidance for Private Security Guards

The Maritime Safety Committee (MSC) of the International Maritime Organization (IMO) has agreed on interim guidance for private maritime security companies, increasingly used by shipping transiting the pirate-infested waters of the Gulf of Aden and Indian Ocean. The use of onboard armed security guards is one factor that appears to have cut the rate of successful pirate hijacks – although pirate activity continues.

In order to recommend private maritime security companies to be certified under relevant national and international

standards, when these are agreed, and comply with all relevant laws, the guidance also covers the use and role of private guards on board ships, including the management of firearms and ammunition.

The MSC also approved interim guidance on measures to prevent and mitigate Somalia-based piracy, as well as repeating its call on governments and the shipping industry to intensify and coordinate efforts to eradicate piracy and armed robbery against ships. According to figures for 18 May from the International Maritime Bureau (IMB) worldwide piracy reporting centre, Somali pirates currently hold captive about 13 vessels and 197 hostages. Hostages continue to include seven Indian seafarers from the Asphalt Venture and four South Koreans from the Gemini, still held captive despite the payment of ransoms.

Involvement of a security company for protection of vessels passing area considered dangerous looks as new business in maritime trade. Armed guards use a weapon which has to be paid by shipper. After passing threatened area and before arriving in the next port of call, the weapon has to be destroyed. This is usually to be done by dropping the same into the sea of Gulf of Aden which is already considered as polluted with weapons before piracy appearing. The price of arms is estimated at 20,000-40,000 USD. It is supplied anew for each trip. It seems that once again benefit everyone except seamen.



IMO agrees guidance for private security guards.

The Latest Piracy Incidents

The latest survey of piracy worldwide shows a worrying increase in incidents off West Africa. Figures from the International Chamber of Commerce (ICC) International Maritime Bureau's (IMB) global piracy report show that 102 incidents of piracy and armed robbery were reported in the first quarter of 2012. In this period, 11 vessels were reported hijacked worldwide, with 212 crewmembers taken hostage and four crew killed. A further 45 vessels were boarded, with 32 attempted attacks and 14 vessels fired on.

Although there has been a decrease in attacks by Somali pirates – down from 97 incidents in the first quarter of 2011 to 43 in the same period of 2012 – there has been an increase in attacks by Nigerian pirates, from 10 for the whole of 2011 to the same number in just the first three months of 2012. Nigerian pirates are also extending their range of operation following the tactics of Somali pirates in using mother-ships from which to launch attacks. In one case, two crewmembers were killed when armed pirates boarded their vessel 110 nautical miles off Lagos, Nigeria.

Despite the fall in Somali pirate attacks, due largely to the presence and intervention of navies in the region, Somali piracy will diminish in the short to medium term unless further actions are taken".

As of 31 March 2012, suspected Somali pirates still held 15 vessels with 253 crewmembers as hostages, with an additional 49 crew held hostage on land. Hostages continue to include seven Indian seafarers from the Asphalt Venture and four South Koreans from the Gemini, still held captive despite the payment of ransoms.

Prosecutions of suspected pirates are now succeeding in many countries. The Kenyan court has now found 11 suspects guilty of piracy; they face potential 20 years in jail. The pirates had been detained by a French warship in 2009 when they had tried to escape from a suspected mother-ship, and were handed over to the Kenyan authorities for prosecution.

There have been two recent examples of naval intervention to prevent pirate activity. On 15 April, a coordinated naval operation led to the rescue of a Yemeni dhow from pirate control. On 18 April, a Spanish warship rescued six Sri Lankan fishers and their fishing vessel 50 miles off the coast of Tanzania. The vessel had been captured in November 2011 and reported to have been used as a pirate mother-ship. Seven suspected pirates were released to the Somali coast as there is currently no agreement on the transfer of suspect pirates between the European Union and Tanzania. There has been a welcome development for the crew of the Italian tanker Enrico levoli, hijacked off the coast of Oman on 27 December. Somali pirates are reported to have released the tanker and its 18 crew – seven Indians, six Italians and five Ukrainians.

The latest incidents worldwide reported to the IMB

Robbers boarded a container ship anchored in the Singapore Strait on 24 April and escaped with ship's stores.

Pirates attempted to board a chemical tanker in the Red Sea on 22 April but abandoned their attack after the onboard security team fired warning shots.

A fishing vessel and two skiffs were reported to have been hijacked 17 nautical miles off Ras Fartak, Yemen on 21 April.

Eight robbers boarded a bulk carrier anchored at Samarinda, Indonesia on 20 April, tied up the duty crewmember who managed to escape and raise the alarm, and escaped with ship's stores and property.

Robbers boarded a tanker anchored in Port Suez, Egypt on 15 May and escaped with ship's stores. There had been a similar theft from a tanker in the port the previous day.

Four robbers boarded a bulk carrier off Isla La Palma, Buenaventura, Colombia on 13 May. After the crew mustered and approached them with steel pipes, the robbers jumped overboard and escaped with ship's stores.

About 12 pirates chased a tanker in the Red Sea on 12 May but moved away after the vessel enforced anti-piracy measures, increased speed and the armed onboard security team displayed their weapons.

Robbers boarded a bulk carrier anchored at Muara Jawa, Samarinda, Indonesia on 12 May and escaped with ship's stores.

Six pirates in a skiff approached and fired on a tanker

around 260 nautical miles off Socotra Island, Yemen on 10 May, but abandoned their attack after the armed onboard security team returned fire.

Robbers boarded a bulk carrier anchored at Taboneo, Indonesia on 10 May and escaped with ship's stores.

Pirates armed with AK47 and rocket-propelled grenade approached and fired on a tanker around 345 nautical miles off Socotra Island, Yemen on 9 May. They moved away after the vessel applied effective anti-piracy measures, but the tanker was damaged by the firing.

Two robbers boarded a bulk carrier berthed at Alger, Algeria on 29 May and dropped the ship's life raft overboard, but escaped empty-handed after the alarm was raised. The crew recovered the life raft.

Four robbers armed with knives boarded a container ship at Contecon Guayaquil terminal, Ecuador on 27 May during a formal inspection. The alarm was raised and the robbers jumped overboard and escaped on a waiting boat.

Two robbers armed with knives boarded a bulk carrier in El Dekheila, Egypt on 25 May and escaped with ship's stores on a fishing boat that had been anchored nearby.

A robber armed with a knife boarded a chemical tanker anchored at Mombasa, Kenya on 24 May, attacked and injured the duty officer, stole his personal belongings and escaped.

Robbers armed with knives boarded a tanker anchored off Patenga Point, Bangladesh on 22 May and escaped with ship's stores. The incident was reported to the coastguard who sent high-speed boats to search the area, catching three robbers and recovering the stolen stores.

Ten small boats surrounded a laden barge being towed by a tug off Talicud Island, Philippines on 17 May. About 30 robbers boarded the barge, transferred the cargo to their waiting boats and escaped.

Airstrikes against Pirates in Somalia

European Union (EU) naval forces made their first attack against pirate bases in Somalia on 15 May. The air attack, launched from naval warships, followed the decision of the EU in March to allow its forces to make strikes against pirate supplies and equipment in Somalia. The move to take action to disrupt piracy on its home ground has the backing of a United Nations Security Council resolution and the transitional federal government of Somalia.

The pre-emptive strike to disrupt pirate activity came in the same week that the International Maritime Organization (IMO) agreed to issue guidance and international standards for private maritime security companies, whose use has cut the number of successful pirate hijacks. The IMO's move came from its maritime safety committee's first high-level policy debate on armed guards.

The meeting also led to the signing of five strategic partnerships between the IMO, UN agencies and the EU to build capacity to counter piracy off the coast of Somalia.

The joint international efforts to counter piracy come as the attacks continue. On 11 May, an EU warship released a fishing dhow and her Iranian crew off the coast of Somalia 10 days after it had been pirated and used to carry out pirate attacks. After surveillance identified the dhow, a boarding team from the Dutch warship, HNLMS Van Amstel, found weapons on board along with the 17 Iranian crewmembers and 11 suspected pirates.

According to the most recent figures from the International Maritime Bureau (IMB) worldwide piracy reporting centre, Somali pirates currently hold captive about 12 vessels and 173 hostages. Hostages continue to include seven Indian seafarers from the Asphalt Venture and four South Koreans from the Gemini, still held captive despite the payment of ransoms.



Airstrikes against pirates in Somalia. Source: Flickr.com

Seafarers at Balance of Justice

Seafarers who have dealings with the criminal justice system are likely to have a very poor experience, according to new research from Seafarers' Rights International (SRI). A 12-month survey of 3,480 seafarers worldwide found that those facing criminal charges complained of unfair treatment, intimidation, and a lack of legal representation and interpretation services.

18 countries and 68 different nationalities of seafarers found that eight per cent of respondents had faced criminal charges,

four per cent had been witnesses in criminal prosecutions, and 33 per cent knew of colleagues who had faced criminal charges. Among masters, almost 24 per cent had faced criminal charges.

Those who had experience of facing criminal charges relating to the discharge of their professional duties had received very poor support – 87 per cent said that they did not have legal representation, 91 per cent who needed interpretation services did not receive them, and 89 per cent did not have their rights



explained to them.

The majority of seafarers who had faced criminal charges – 80 per cent – said they felt intimidated or threatened, and 81 per cent did not consider that they had received fair treatment.

As well as the survey of seafarers, SRI reviewed all incidents involving criminal charges against seafarers reported in the maritime media for the 12 years 2000 to 2011. It found 415 incidents involving 1,580 seafarers, with an increase in the numbers of maritime criminal incidents and detained seafarers over this period.

It is an inherent risk in the working lives of seafarers that they may be subjected to criminal charges either of a professional or a non-professional nature. Seafaring is transnational by nature. As seafarers transit from port to port, they are subject to the entire range of criminal laws of those port states. They cannot know and they are unlikely to have been warned about local criminal laws, and hence they are at risk of committing an offence without any awareness or intention to do so. Further, in recent years, several legal developments at international, regional and national levels have criminalized a number of previously considered lawful seafaring activities and created a blame culture, particularly in relation to environmental incidents such as oil pollution.

In an era where 'human rights' are considered sacrosanct and 'fairness' a right in itself, seafarers sometimes seem to be excluded from the entitlements accorded to others. They may be foreign nationals, and after an incident there is often a reluctance to release seafarer defendants or witnesses who are deemed to be a 'flight risk', and who might not appear at a subsequent trial. They are, therefore, treated differently and less fairly than nationals, and are often discriminated against. They might have the continued support of their employers, but if they are less fortunate once the ship itself is released, they may find themselves friendless in a strange land, facing charges that are incomprehensible to them under a wholly alien system of justice, and with defence counsel unfamiliar with the technical nuances of the maritime scene. Language, and the lack of adequate translation facilities, might well be a serious handicap.

The fear of liability

In any survey conducted to determine the attitudes of seafarers, in order to establish and rank their concerns about contemporary issues, the risk of facing criminal proceedings because of their particular employment will be found high on the list of their worries.

There have been some notorious cases in recent years which have been given wide publicity for the clear injustices they have represented. These cases have served to encourage a climate in which there is a very real fear of criminalization among seafarers all over the world. Crews are also concerned about the practice of holding seafarers for months on end to serve as witnesses in a subsequent trial, hence they are forced to remain away from home without remission. (View high profile cases)

Whatever the age, nationality, rank or seniority of the seafarers, the fear of criminalization, which probably would not have featured in a similar survey undertaken 20 years ago, is both real and sincere. And while it can be statistically argued that the chances of such a fate befalling any seafarer remains very low indeed, perception is a powerful driver.

The consequences are already apparent, in that otherwise ambitious and well-qualified officers are declining promotion to senior ranks, believing that this would leave them more exposed to the risks of prosecution and a subsequent criminal conviction. There are documented cases of senior officers electing to terminate their careers because of a brush with the law, or deciding to seek alternative employment that would leave them less vulnerable to criminal prosecution.

Right across the shipping industry, there is a strong belief that somehow the tide which increasingly threatens seafarers with criminal sanctions and discriminates against them must be turned. Seafarers' organizations, their employers, regulators and non-governmental bodies – in addition to seafarers themselves –agree that this important body of essential workers needs protection from unfairness and injustice and, moreover, to reassure seafarers that they will be treated properly should they become involved in an incident or accident, particularly under a foreign jurisdiction. It has been suggested on more than one occasion that the continued detention of crew members in the past, whether criminal charges have been laid against them or not, has been used as a bargaining chip in a subsequent case over liability and compensation.

In May 2004, the Legal Committee of the IMO endorsed the proposal to establish a joint IMO/ILO Working Group on Fair Treatment of Seafarers. In 2006, the IMO and the ILO promulgated the "Guidelines on the Fair Treatment of Seafarers in the event of a Maritime Accident". The objective of the Guidelines is "to ensure that seafarers are treated fairly following a maritime accident and during any investigation and detention by public authorities and that detention is for no longer than necessary." The Guidelines, which now must be read in the light of the Casualty Investigation Code, "do not seek to interfere with any State's domestic, criminal or civil law processes..." They are limited to the investigation of "maritime accidents", although there is a general invitation "to take note of the principles contained in these Guidelines when considering the fair treatment of seafarers in other circumstances where innocent seafarers might be detained."

But the criminalization cases that have seized the attention of the global industry have encouraged the strong belief that something more than codes or recommendations must be produced to protect seafarers from the injustices which they can suffer when they are involved in incidents and accidents. The situation, it is suggested, will impact upon both recruitment and retention at a time when both are important for the industry's future.

SRI has made Seafarers' Rights and the Criminal Law a priority subject. Its project will analyze international maritime legal instruments, competing criminal jurisdictions and human rights protection for seafarers in order to get a full picture of how seafarers are exposed to criminal charges. It will also promote a structure of assistance to seafarers at a practical level which may involve unions, ship owners, lawyers, charities and others concerned with the welfare and rights of seafarers.

The Filipino captain and navigation officer of the Greekowned Rena, which grounded on a reef off New Zealand on 5 October 2011 causing the worst maritime environmental disaster in the country, have been jailed for seven months each for their role in the container ship's oil spillage.

Captain Mauro Balomaga and navigation officer Leonil Relon were found guilty of operating a vessel in a manner likely to cause danger, and of altering ship documents.

Maritime New Zealand said the two senior officers had breached basic principles of safe navigation. A Transport Accident Investigation Commission interim report suggested that the Rena took several shortcuts before it hit the reef.

The Rena's owner, Daina Shipping Co, has also been charged with the discharge of harmful substances in the coastal marine area and faces a maximum fine of NZ\$600,000 and \$10,000 for every day the offending continues.

Seafarers' Rights



The view from the deck of a ship surrounded by barbed wire against pirate attacks.

Seafarers' Rights International is a unique and independent centre dedicated to advancing seafarers' interests through research, education and training in the law concerning seafarers.

"Seafarers are the lubricant without which the engine of trade would simply grind to a halt... Seafarers are the unsung heroes of an unsung industry," said Efthimios Mitropoulos, secretary general of the International Maritime Organization.

Approximately 1.5 million seafarers daily serve on a worldwide fleet of over 100,000 ships that transport over 90% of world trade – manufactured goods, fuel, foodstuffs and commodities that we all rely on but generally take for granted.

Seafarers operate in one of the most dangerous occupations

in the world. They are mobile workers and are highly vulnerable to abuse, exploitation, ill treatment and injustice.

Seafarers' Rights International (known as SRI) is the first pan-industry initiative in the maritime sector that seeks to bring together expertise in the shipping industry and the legal world to advance the rights and legal protection of seafarers.

"The SRI is an ambitious, long-term project. If it is successful in meeting its declared objectives, it could make a major contribution to enhancing seafarers' rights worldwide and help counteract recent negative publicity deterring potential recruits that are vital to the (shipping) industry's future." Lloyd's List, September 2010



Disembarkation of seafarers

The problem of signed off seafarers is a stark one of human hardship. The International Labour Organization (ILO) keeps a database of cases of signed off and, given the vital role of shipping in the global economy, the figures should be a source of concern.

According ITF, between 2001 and 2010, 136 ships and 1,612 seafarers were signed off. In 2009 alone, at the height of the global economic downturn, a total of 57 vessels were signed off affecting 647 seafarers.

The number of cases of abandonment reported in the ILO database has fallen since 2009, but the ILO list is far from definitive. Signing off is not easily defined and a crew may have been forsaken even though officially the ship has not been abandoned.

Each instance of a seafarer being signed off far from home and without the means to get back is an individual story of enormous hardship. The real extent of the problem has never been accurately measured.

Signing of can happen for a number of different reasons. It is often a calculated economic decision by a ship owner facing bankruptcy, insolvency or the arrest of its vessel by creditors. In many cases, vessels are abandoned after they are detained by port state control inspectors as unseaworthy. The global economic downturn has hit some operators hard, but it is often the crews who come off worst.

When a crew on a merchant ship has been signed off in a foreign port, there is very often a depressingly familiar pattern of things that start happening. They run out of fuel for generators, sometimes also food and water. Often the ship owner stops answering his phone and cannot be traced. On other occasions, the ship owner remains in the background, sometimes threatening the crew, more often making false promises that he cannot keep. Onboard, phone cards run out of credit and seafarers cannot call home. The mood sinks and tempers flare, a potent mix exacerbated by boredom. And the impact of abandonment stretches far beyond the ship itself. When seafarers have not been paid for months and cannot get back home, their families suffer too. Crew onboard and their families back home, are left begging for handouts in order to survive.

For those left to pick up the pieces in a case of abandonment, the lack of a framework to adequately protect seafarers is frustrating. "We see this time and time again, yet nothing is ever done to stop it," said Jose Manuel Ortega, National Coordinator for the International Transport Workers' Federation in Spain, and a man who has dealt with numerous such cases over the years. "How is it possible that a ship owner can just walk away from his crew?"

International efforts

The international community has worked on a regulatory framework designed to protect seafarers and geared to their very specific circumstances. But the efforts have been painfully slow (international efforts). The ILO Maritime Labour Convention (MLC), which was adopted in 2006, could go a long way to improving working conditions for those who earn their living at sea. But its immediate impact on the issue of abandonment remains to be seen, whereas an amendment to the convention dealing specifically with the issue of abandonment is heralded in some quarters as the solution to abandonment. The aim is to create a mandatory financial security net for abandoned seafarers, thereby removing abandonment as a viable business decision. But while this potential international solution unfolds, crews will continue to be abandoned, their basic rights breached and their family life strained at best, destroyed at worst.

For the shipping industry and the global economy that it serves, tackling this problem should be of paramount importance. It is not just about the abandoned crews and their families, but about the future of the industry itself.

Women Seafarers

It's still rare to find women workers at sea but, largely thanks to trade unions, more women are confronting prejudice and becoming valuable members of ships' crew.

Women make up only an estimated 2% of the world's maritime workforce. Women seafarers work mainly in the cruise and ferries sector, often for Flags of Convenience (FOC) vessels. These are among the worst paid and least protected of jobs at sea. Women also tend to be younger, and fewer are officers than their male crew mates.

Their low number means that women can be subject to discrimination and harassment. The maritime unions are alert to these dangers and strive to protect the interests of women members – who now number about 23,000 worldwide.

Women can face discrimination even getting into seafaring work. In some countries, for example, maritime education and training institutions are not allowed to recruit women to nautical courses. Women tend to enrol on navigation rather than engineering courses. Even once trained, they may have to face prejudice from ship owners who won't employ women. Once employed, women seafarers may also face lower pay even though they are doing work equivalent to that of male colleagues. Women may also be denied the facilities or equipment available to male workers, which is a form of discrimination.

If you are a woman seafarer facing such discrimination, contact your trade union for support and advice.

Bullying and harassment are problems for male and female seafarers alike. Such unacceptable behaviour may come from colleagues or managers, and are known causes of ill health. Although these are issues for many workers, they can be a particular problem if you are employed at sea, where you are isolated from family and friends and other sources of support.

Women seafarers may also have to deal with sexual harassment or even abuse while at sea. Many maritime unions now have policies covering sexual harassment.

Pregnancy should never be treated as a disciplinary offence. Pregnancy testing before you are employed may violate International Labour Organisation (ILO) Convention 183.

Cruise

Approximately 150,000 people currently work on cruise ships around the world. Many are drawn to the industry, as it is a way to visit distant places, meet new people, and earn money at the same time. But the job isn't always as glamorous as it sounds.

Why is working on a cruise ship stressful?

On many cruise ships the crew totals over 1,000 people and there are generally three or even four passengers to every crew member. It's a lot of bodies – from many different backgrounds – in a relatively small space. ITF surveys show that cruise ship crews are working harder, for longer hours than ever before. But, whatever the pressures, if you are in contact with the passengers, you have to keep smiling at all costs.

Relaxation can also be a problem. Most cruise ship workers are at sea for many months at a stretch, and only get a few hours on shore when the ship is in port. Sharing a small cabin over a long period can create good friendships but it can also be a source of great stress, especially if the ship's managers turn a blind eye to sexual predators among the crew or passengers. Safe procedures for reporting any sexual intimidation should exist on board.

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Cargo Handling by Seafarers

Seafarers are increasingly being asked to stow or secure cargo but this is dangerous work that should only be done by trained and experienced dockers. Although there may be some extra cash for seafarers – tempting, as it boosts low pay – the larger incentives are often for the officers on-board who get the seafarers to handle the cargo. Seafarers are even being asked to start unlashing containers before entering port, with the aim of speeding up port operations, which is very dangerous.

There are great risks to safety at sea and to individual seafarers if untrained workers handle cargo – it's a job for port workers not seafarers:

- It's dangerous unless you're properly trained
- It means longer working hours and more fatigue
- It's another way the operator makes money out of you
- Port workers respect the skills of seafarers and their fellow workers and, in turn, ask that cargo-handling be left to the experts.

Cargo-handling by seafarers is part of the wider deregulation and liberalization of the maritime industry being pushed by many employers and the governments that support them. Their aim is to compete by lowering cost. They want to squeeze more from seafarers and dockers through 'flexible' working practices, longer working hours and/or less pay. In the process they undermine the protective regulations that workers have fought long and hard for. They are trying to displace the trained, experienced and registered port workers. In some cases they take on casual, unregistered and inexperienced labour in the terminals. Or they get seafarers to do the job. Employers are especially keen to weaken the trade unions of dockers. Organized dockers have the power, which they do use from time to time, to refuse to load or unload goods. They can bring to a halt the just-in-time supply chain that is vital to the production and distribution of goods around the world. Dockers take such action to stand up for their own rights. But they also do it to support others, especially seafarers. In fact, the solidarity shown by port workers refusing to load or unload a vessel has often been critical in the struggle to win better working terms and conditions for the seafarers onboard. Dockers are seafarers' natural allies.

Why is cargo-handling by seafarers bad for seafarers?

Cargo-handling is dangerous for seafarers because you are not trained for the work. In January 2007, a Filipino seafarer was crushed to death by an eight-ton container on an Antigua and Barbuda-flagged vessel berthed in the port of Rotterdam in the Netherlands. The tragedy happened while crew members were



Cargo Handling by Seafarers. Source: Flickr.com

lashing cargo. As well as deaths among seafarers, there have been accidents at sea among vessels made unsafe by badly lashed containers. Cargo-handling also adds to the stress and fatigue that seafarers already suffer through long working hours, tight sailing schedules and fast turnaround times. It means even less rest time in port, when you hope to make contact with family and friends back home. Fatigue has also been highlighted as a major factor behind accidents in port and at sea. On top of this, eroding the power of unionized dockers is not good for seafarers, because dockers often give you solidarity when you need it.

Why is cargo-handling by seafarers bad for dockers?

If you do the work, it takes jobs away from qualified dockers. Cargo-handling is work for professionals. It should only be done by those who have been specifically trained to do it, so that it is done in a safe and efficient way. It is dangerous, too, for dockers when they have to unload cargo that has been loaded by untrained workers. It erodes the power of dockers' trade unions, your natural allies.

New Technology of Catamaran Shipbuilding

"PlanetSolar" is a catamaran that runs solely on energy found in light. The additional removable parts allow it to expose a total of 537 m2 of photovoltaic surface (solar panels) to the sun. This impressive data make it the biggest solar-run ship in the world. The designer of PlanetSolar, Craig Loomes from New Zealand, has already imagined numerous innovative ships around the world. Several months of research enabled to finish the ideal dimensions and design of this double hull vessel with respect to the chosen journey. Engineers had to optimise the energy collection and stocking but also the aerodynamics, the ship's propulsion and the choice of materials.

The incredibly light carbon structure of this futuristic vessel with electric motorisation is extremely durable.

PlanetSolar is the biggest solar ship in the world

On its round-the-globe expedition, the TÛRANOR PlanetSolar will pioneer the use of sustainable energy technology on water. It is different from anything that has happened in the field of mobility to date. This solar catamaran uses the very latest cutting-edge technology available on the market. Their intention is to demonstrate that high-performance solar mobility can be realised today by making innovative use of existing materials and



Krilo Carbo catamaran making way. Source: http://krilo.hr/



Catamaran powered by photovoltaic cells. Source: http://www.planetsolar.org/

technology. The name TÛRANOR is derived from the "Lord of the Rings" saga by J.R.R. Tolkien and translates as "the power of the sun" and "victory."

Challenges

Energy management: mobility shall not use more energy than that provided by the power of the sun.

Efficiency: S-mobility (smart and solar mobility) only makes sense if the costs are reasonable and competitive. Therefore, we are mainly using materials and technology available today which have the potential to be mass-produced, thus lowering prices and operating costs considerably over time.

Gleaming with more than 500 sq meters of photovoltaic panels and packing 11 tons of batteries (with chassis), including the 388V lithium-ion battery, Tûranor is a showcase for solar power advancements and sustainable transport. To support the multi-hull ship's planned average speed of 7.5 knots over 31,069 miles and 140 days, WAGO supplied three 758 Series IPCs with control functionality and electrical components (Source: planetsolar.org/the-boat).

IMSC 2013: Upcoming Conference on Maritime Science



Topics of interest

- ~ Marine Engineering,
- ~ Navigation,
- ~ Safety Systems
- ~ Marine Ecology,
- ~ Hydrography,
- ~ Marine Automation and Electronics,
- ~ Transportation and Modes of Transport,
- ~ Marine Information Systems,
- ~ Maritime Law,
- ~ Management of Marine Systems,
- ~ Maritime Health,
- ~ Marine Finance,
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- ~ Safety and Security,
- ~ Ecology and Sea,
- ~ Intelligent Transport Systems,
- ~ Human Resources in Transport,
- ~ Education in Transport.

Conference Proceedings

Authors are invited to submit abstracts on e-mail imsc@pfst.hr. Abstracts should be text only up to 250 words long, and should be written in English and Croatian language. Immediatly after abstract, please provide at least 4 keywords. Single author may participate in up to two papers, irrespectively of number of co-authors per paper. The abstracts should be sent until 1st December 2012. The authors will be informed about acceptance no later than 18th December 2012. All accepted abstracts will be published in the Book of Abstracts.

Official Language of the Conference

Papers should be submitted in English. Presentation slides should be given in English, and oral presentation can be made in either English or Croatian.

Registration

Conference registration deadline is 8th April 2013. Conference participation fee is 1.000,00 HRK or 150,00 EUR (VAT included). Registration form should be sent to imsc@pfst.hr.

Contact

University of Split Faculty of Maritime Studies INTERNATIONAL MARITIME SCIENCE CONFERENCE Zrinsko-Frankopanska 38, 21000 Split, Croatia Tel: +385 (0)21 380-762; Fax: +385 (0)21 380-759 E-mail: imsc@pfst.hr www.pfst.hr/imsc

Location

HOTEL PRESIDENT SOLIN Ulica kralja Petra Krešimira IV 11, HR-21210 Solin phone: +385 (0)21 685 300, fax: +385 (0)21 685 301, e-mail: solin@hotelpresident.hr, web: www.hotelpresident.hr/solin/

Covik riba

Ante Božanić

Fish-man

trans. by Mirna Čudić

Grên zaneràt udàhnen ca dùbje da mògu izdurât

Ukarcôn pîz i kontrapîz jer môre me dvĭže daržî, vūcề, obūcề gârli, operê, opījề môre sa mềnom igrô na zm`ije

> Dầ mi je bîlo dupîn bìt svû lipotù môra olkrìt

Silnô tišinâ i mirnoćâ modrĭlo môra i dubinâ

Kûrin i dāje ``spol osöja korālja sve věće dûšla mi vöja l am going to plunge in, l take a breath deep enough to endure

I load a weight and a counter-weight for the sea lifts me up it holds me, pulls me, enfolds me, it embraces me, washes me, inebriates me, the sea plays hide-and-seek with me

> If only I were a dolphin to discover all the beauties of the sea

> > Immense silence and tranquillity the blue of the sea and its depth

I am proceeding further downwards under the shade hosts of corals come into view I feel tempted



Övo kolûmbe övo sinjôl ovôde je brûd ol ântike ostôl Âmfora pijât

čìkara fjāsak pùno lopìža s ovîn pùno dobīje Komìža

Covìk je rìba covìk je dupîn po cîle nồći jo vềj ne spîn

Dubinâ môra covìka opìje covìka zanesë stôj atènto dà te ne olnesë Behold the keel behold the mark a ship from the Antiquity lies beneath

An amphora a plate, a cup a crock a kettle brimming with a cornucopia of fish, Komiža gains a lot from these

> Man is a fish man is a dolphin I pass numberless sleepless nights

The depth of the sea inebriates you it enraptures you beware lest it should drag you away

Dedicated to the divers by Pepe Kalafot (shipbuilder) from Komiža

Roniocima Pepe Kalafot iz Komiže

RJEČNIK

covĩk	čovjek
grên zaneràt'	idem zaroniti
izdurât'	izdržati
ukarcat'	ukrcati, natovariti
pîz	uteg
kontrapîz	protuuteg
zmìje	igra skrivača
kurit'	ići
osöj	sjena
võja	želja
kolûmba	kobilica broda
sinjôl	znak na moru
brûd	brod
pijât	tanjur
čĩkara	šalica
fjāsak	vrč, ćup
lopìža	kotao, lonac, <i>bronzin</i>
jo vềj ne spîn	ja više ne spavam
stôj atềnto	pazi
kalafôt	kalafat, brodograditelj u drvu

Autor rječnika: Željka Zanchi, prof.

Guidelines for Authors: Scope of Transactions on Maritime Science

The Journal is published in English as an open access journal, and as a classic paper journal (limited edition).

ToMS aims at presenting the best maritime research primarily, but not exclusively, from Southeast Europe, particularly the Mediterranean area. Prior to being accepted for publication, each article is reviewed by at least two reviewers. With the intention of providing an international perspective at least one of the reviewers will be from abroad. ToMS also promotes scientific collaboration with students and has a section entitled Students' ToMS. These articles also undergo strict peer reviews. Furthermore, the Journal publishes short reviews on significant papers, books and workshops in the fields of maritime science.

Our interest lies in general fields of maritime science (transport, engineering, maritime law, maritime economy) and the psychosocial and legal aspects of long-term work aboard.

1. GUIDELINES FOR AUTHORS: MANUSCRIPT PREPARATION AND SUBMISSION

1.1. Organization of the manuscript

First (title) page

The first page should carry:

- (a) the paper title;
- (b) full names (first name, middle name initials, if applicable), and last names of all authors;
- (c) names of the department(s) and institution(s) to which the work should be attributed. If authors belong to several different institutions, superscript digits should be used to relate the authors' names to respective institutions. Identical number(s) in superscripts should follow the

authors names and precede the institution names;

- (d) the name, mailing address and e-mail of the corresponding authors;
- (e) source(s) of research support in the form of financial support, grants, equipment or all of these.

Last page

The last page should carry:

- (a) ethical approval, if required;
- (b) authors' declarations on their contributions to the work described in the manuscript, their potential competing interests, and any other disclosures. Authors should disclose any commercial affiliations as well as consultancies, stock or equity interests, which could be considered a conflict of interest. The details of such disclosures will be kept confidential but ToMS urges the authors to make general statements in the Acknowledgement section of the manuscript.
- (c) a list of abbreviations used in the paper (if necessary);

Other pages

Each manuscript should follow this sequence:

- title page;
- abstract;
- text (Introduction, Methods, Results, Conclusions/Discussion);
- acknowledgments;
- references;
- tables (each table complete with title and footnotes on a separate page);
- figures and figure legends, and the last page.

1.2. Text organization and style

1.2.1. Abstract

The second page should contain the Abstract. ToMS requires that the authors prepare a structured abstract of not more than 250 words. The abstract should include (at least) four sections: Aims, Methods, Results, and Conclusion, not necessarily separated.

Aim. State explicitly and specifically the purpose of the study.

Methods. Concisely and systematically list the basic procedures, selection of study participants or laboratory/ experimental/simulation setup, methods of observation (if applicable) and analysis.

Results. List your primary results without any introduction. Only essential statistical significances should be added in brackets. Draw no conclusions as yet: they belong in to the next section.

Conclusion. List your conclusions in a short, clear and simple manner. State only those conclusions that stem directly from the results shown in the paper. Rather than summarizing the data, conclude from them.

1.2.2. Main text

Do not use any styles or automatic formatting. All superscripts or subscripts, symbols and math relations should be written in MathType or Equation editor.

Introduction

The author should briefly introduce the problem, particularly emphasizing the level of knowledge about the problem at the beginning of the investigation. Continue logically, and end with a short description of the aim of the study, the hypothesis and specific protocol objectives. Finish the section stating in one sentence the main result of the study.

Results

Key rules for writing the Results section are:

- (a) the text should be understandable without referring to the respective tables and figures, and vice versa;
- (b) however, the text should not simply repeat the data contained in the tables and figures; and
- (c) the text and data in tables and figures should be related to the statements in the text by means of reference marks.

Thus, it is best to describe the main findings in the text, and refer the reader to the tables and figures, implying that details are shown there. The formulations such as "It is shown in Table 1 that the outcome of Group A was better than that of Group B" should be replaced by "The outcome of Group A was better than that of Group B (Table 1)." The need for brevity should not clash with the requirement that all results should be clearly presented.

Discussion/Conclusions

The discussion section should include interpretation of study findings in the context of other studies reported in the literature.

This section has three main functions:

- (a) assessment of the results for their validity with respect to the hypothesis, relevance of methods, and significance of differences observed;
- (b) comparison with the other findings presented in the relevant literature; and
- assessment of the outcome's significance for further research.

Do not recapitulate your results, discuss them!

1.2.3. Tables

Information on significance and other statistical data should preferably be given in the tables and figures. Tables should not contain only statistical test results. Statistical significances should be shown along with the data in the text, as well as in tables and figures.

Tables should bear Arabic numerals. Each table should be put on a separate page. Each table should be self-explanatory, with an adequate title (clearly suggesting the contents), and logical presentation of data. The title should preferably include the main results shown in the table. Use tables in order to present the exact values of the data that cannot be summarized in a few sentences in the text.

Avoid repetitive words in the columns: these should be abbreviated, and their explanations given in the footnotes. Present data either in a table or a figure.

Each column heading for numerical data given should include the unit of measurement applied to all the data under the heading.

Choose suitable SI units.

Place explanatory matter in footnotes, not in the heading. Explain in footnotes all nonstandard abbreviations that are used in each table.

1.2.4. Figures

Figures should be numbered in sequence with Arabic numerals. Legends to figures should be listed on a separate page, in consecutive order. The legend of a figure should contain the following information:

- (a) the word "Figure", followed by its respective number;
- (b) figure title containing major finding (e.g. Manuscripts which follow Guidelines for Authors had higher acceptance

rate, and not Relationship with manuscripts style and their acceptance rate).

Use simple symbols, like closed and open circles, triangles and squares. Different types of connecting lines can be used. The meanings of symbols and lines should be defined in the legend. Each axis should be labelled with a description of the variable it represents.

Only the first letter of the first word should be capitalized. The labelling should be parallel with the respective axis. All units should be expressed in SI units and parenthesized. Make liberal use of scale markings.

Graphs, charts, titles, and legends in accepted manuscripts will be edited according to ToMS style and standards prior to publication.

Preferred format for graphs or charts is xls. Graphs and charts saved as image (raster) files such as JPG, TIF, or GIF and imported or copied/pasted into Word or Power Point are not acceptable.

The resolution for photographic images should be at least 300 dpi, and minimum image width should be 6 cm. Please submit files in RGB format. For published manuscripts, image files will be posted online in their original RGB format, maintaining the full colour of your original files. Note that we will still need to convert all RGB files to CMYK for printing on paper and colour shifts may occur in conversion. You will not receive a CMYK proof. You can view an approximation of print results by converting to CMYK in Adobe® Photoshop® or Adobe® Illustrator®.

1.2.5. Authorship statement

All contributing authors must fill out and sign these statements and submit them to the Editorial Office. Accepted manuscripts will not be published until signed statements from all authors have been received.

1.2.6. Acknowledgments

Technical help, critical reviews of the manuscript and financial or other sponsorship may be acknowledged. Do not acknowledge paid services, e.g. professional translations into English.

1.2.7. References

References cited in the manuscript are listed in a separate section immediately following the text. The authors should verify all references.

Examples of citation in text:

It is well known fact (Strang and Nquyen, 1997; Antoniou, 2006) that FT is not an appropriate tool for analyzing nonstationary signals since it loses information about time domain. First group of authors (Vetterli and Gall, 1989) proposed Multiresolution Signal Analysis (MRA) technique or pyramidal algorithm. Second group (Crochiere et al., 1975; Crochiere and Sambur, 1977) proposed subband coding algorithm.

Legal acts are cited as in exmaple: The Constitution of the Republic of Croatia (Constitution of the Republic of Croatia, 2010) is the main legal source for this subject matter, as well as any other subject matter relating to the Croatian legal system.

References from the Web are cited in the text as (Author(s) last name, year of origin if known (year of accessed in other cases). If the author is unknown, such as in case of company web page, instead of author's name, title of the web page is used.

Examples for reference section:

Journals

Pennec, E. and Mallat, S., (2005), Sparse Geometric Image Representations with Bandelets, IEEE Transactions on Image Processing, 14(4), pp. 423 – 438., http://dx.doi.org/10.1109/TIP.2005.843753

Web links

Donoho, D., Duncan, M. R., Huo, X. and Levi, O., (1999), Wavelab, available at: http:// www.stat.stanford.edu /_wavelab/ [accessed 12 August 2011.]

Unknown, Wavelab, available at: http://www.stat.stanford.edu /_wavelab/, [accessed 12 August 2011.]

ToMS home page, available at http://www.toms.com.hr, [accessed 12 July 2012.].

Books

Mallat, S., (2009), A Wavelet Tour of Signal Processing, 3rd Edition, New York : Academic Press.

Conference proceedings

Kingsbury, N.G. and Magarey, J.F.A. (1997), Wavelet Transforms in Image Processing Proc. First European Conference on Signal Analysis and Prediction, Prague, Czech Republic, June 24 – 27, Birkhäuser, pp. 23 – 24., available at: http://www.sigproc.eng. cam.ac.uk/~ngk/publications/ngk97b.zip, [accessed 12 August 2011.].

Regulations, standards or legal acts:

Constitution of the Republic of Croatia, (2010), Narodne novine, 2010(76), pp. (if known).

1.2.8. Language

Authors may use standard British or American spelling, but they must be consistent. The Editors retain the customary right to style and, if necessary, shorten texts accepted for publication. This does not mean that we prefer short articles – actually, we do not limit their size - but rather a resection of the obviously redundant material.

The past tense is recommended in the Results Section. Avoid using Latin terms; if necessary, they should be added in



parentheses after the English terms. Real names rather than "levels" or "values" should refer to parameters with concrete units (e.g. concentration).

1.2.9. Abbreviations

Only standard abbreviations and symbols may be used without definition and may be used in the title or the pageheading title.

Non-standard abbreviations should not be used in the title or page-heading title. They must be explained in the text in the following way: the term should be written in full when it appears in the text for the first time, followed by the abbreviation in parentheses; from then on, only rel abbreviation is used in the text. This applies separately to the Abstract and the rest of the text.

1.3. Submission of manuscripts

All manuscripts should be submitted to:

Editorial office

Transactions on Maritime Science, Faculty of Maritime Studies, Zrinsko-frankopanska 38, 21000 Split, Croatia www.toms.com.hr | office@toms.com.hr

2. ETHICAL POLICIES OF ToMS

Plagiarism is arguably the most complicated ethical issue. Our policies define plagiarism as "taking material from another's work and submitting it as one's own." ToMS *holds authors not the Publisher or its editors and reviewers* — *responsible* for ensuring that all the ideas and findings included in a manuscript are attributed to the proper source. We also refer to our role as steward of what constitutes ethical conduct. Ethical misconduct is the reason for our commitment to continue to strive to educate all the parties in the publishing process how to handle this matter.

As a member of Crossref, ToMS has a powerful weapon – iThenticate system, which is not perfect.

"Even if there were reliable and sensitive plagiarismdetection software, many issues would remain to be addressed. For example, how much copying is legitimate? Clearly, the reuse of large amounts of others' text constitutes plagiarism. But what should one think about copying short passages from the author's own earlier work, such as commonly occurs in the Methods section? In the *Nature* article it is suggested that some journals set a quantitative limit whereby the amount of text that can be reused is limited to about 30 percent. This may be utilitarian, but it seems curious and arbitrary that 25 percent of copied text might be deemed acceptable whereas 30 percent might not. Indeed, two authors who copied the same number of words could find themselves on opposite sides of that border if one author simply was more verbose and thus diluted their plagiarized content below the threshold! No, this is not a simple issue at all." [cited from: http://www.aspb.org/newsletter/ethicalstandards.cfm]

2.1. Expectations for publishing in ToMS

Faculty of Maritime Studies expects authors submitting to and publishing in its journals to adhere to ethical standards to ensure that the work they submit to or publish in the journal is free of scientific misconduct. Authors must:

- Take credit only for work that they have produced.
- Properly cite the work of others as well as their own related work.
- Submit only original work to the journal.
- Determine whether the disclosure of content requires the prior consent of other parties and, if so, obtain that consent prior to submission.
- Maintain access to original research results; primary data should remain in the laboratory and should be preserved for a minimum of five years or for as long as there may be reasonable need to refer to them.

All authors of articles submitted for publication assume full responsibility, within the limits of their professional competence, for the accuracy of their paper. Instances of possible scientific misconduct related to papers submitted to or published in the ToMS will be addressed by following the procedure outlined below.

2.2. Procedure for addressing allegations of scientific misconduct or other ethical violations

Scientific misconduct in publishing includes but is not limited to:

- Fraud: fabricating a report of research or suppressing or altering data;
- Duplicate publication;
- Plagiarism and
- Self-plagiarism.

2.2.1. Procedure for handling allegations of misconduct

- All allegations of scientific misconduct or ethical violation will be referred to the editor for research integrity or to the editor-in-chief. All allegations should be made in writing.
- Editor for research integrity will report the case in the meeting of the Editorial board and recommend the actions in 30 days.
- Except redraw of the paper, punishment could be inclusion in the black list of the journal and prohibition of further publishing in ToMS.